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MILITARY HYDROLOGY

RESEARCH & DEVELOPMENT BRANCH

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Corps of Engineers

Washington District

Dept. of Army

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SPECIAL STUDY S-51-4
WESER RIVER SYSTEM
HYDRAULIC EFFECTS OF DEMOLITION
OF EDER DAM
VOLUME II

Prepared by
Military Hydrology R & D Branch
Engineering Division
Washington District Corps of Engineers
Washington, D. C.
March 1952

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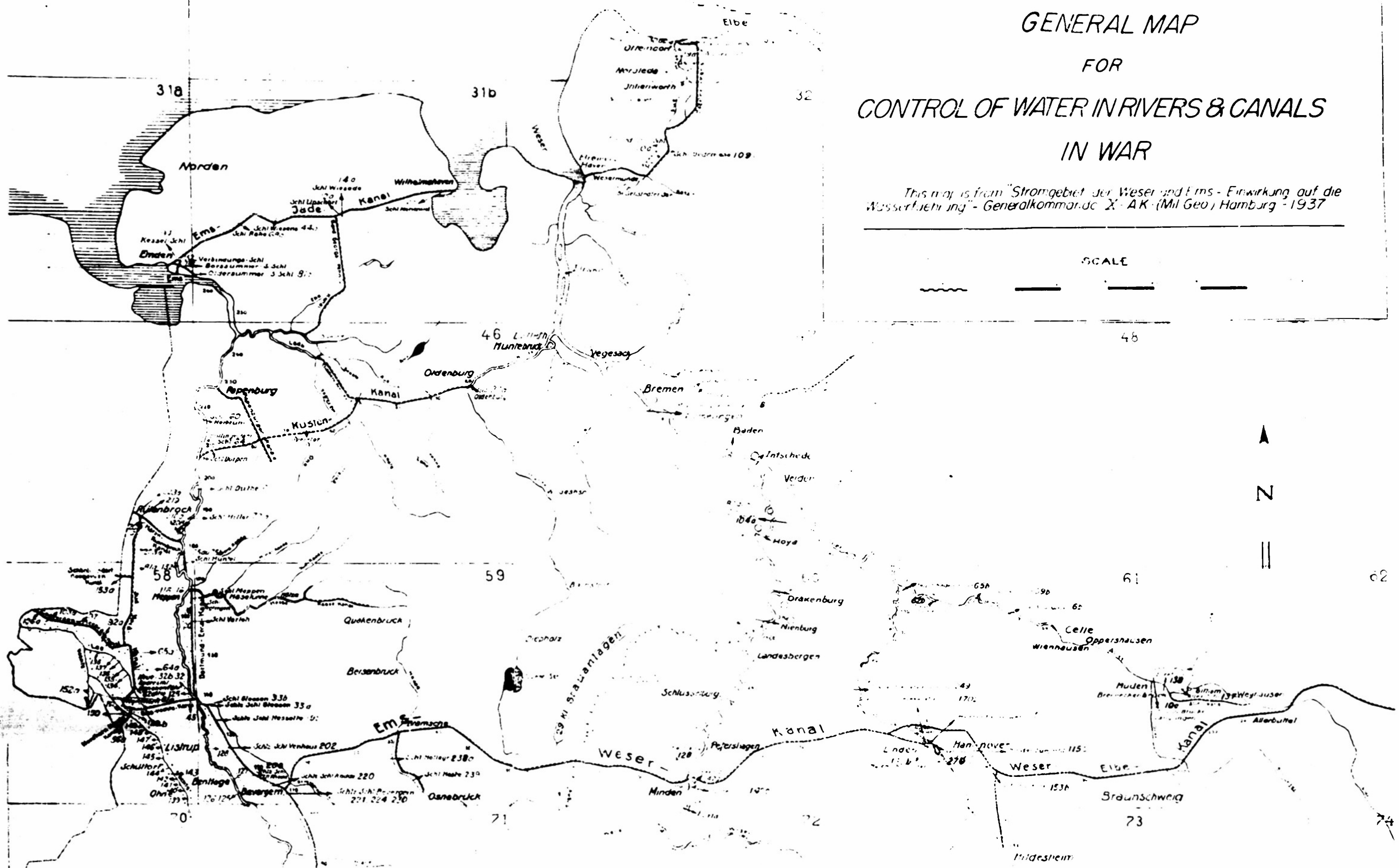
HYDROLOGIC TERMS AND ABBREVIATIONS FROM ENGLISH LITERATURE
(See Jahrbuch für die Gewässerkunde des Deutschen Reichs (Berlin, 1937))

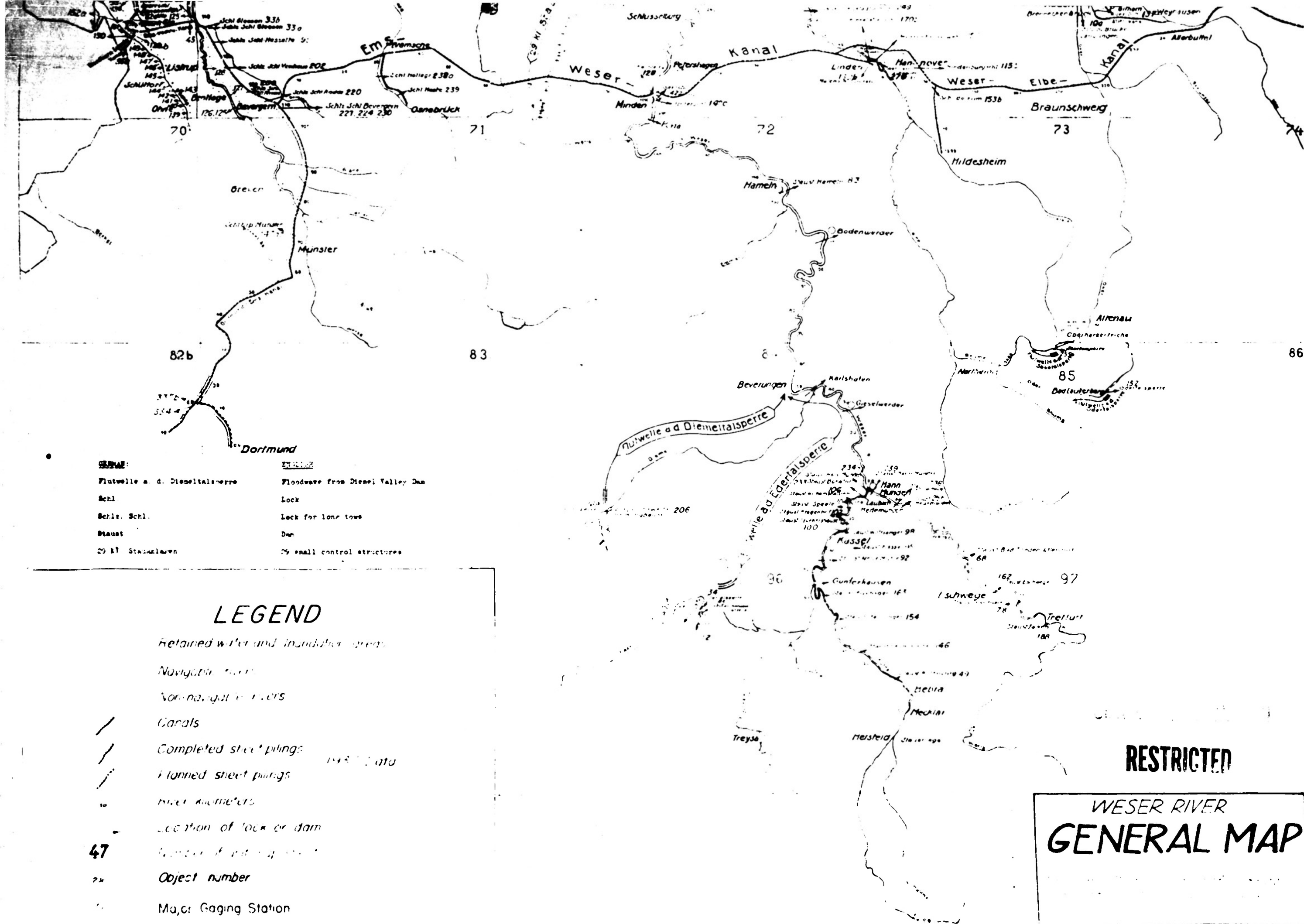
	Water levels as given in centimeters			Discharge		Water temperatures as given in degrees centigrade	Remarks
	Other than tide water regions	Tide high water	Tide low water	Amount as given in cubic meters per second	Discharge as given in liters per sq. kilometer		
	(W)	(Thw)	(Tlw)	(Q)	(Q)	(T)	
a. The highest high value (HH) ever known or encountered. (The absolute maximum).	HHW	HHThw	HHTw	HHQ	HHq	HHW	a. The highest value ever known or encountered up to now (1937). For example, HHW is the highest water temperature that has ever been measured at any one spot.
b. The highest value (H) encountered in the space of time covered.	HW	HWThw	HWTw	HQ	Hq	HT	b. As compared to HH in column a, where the time limit, the symbol in this column has a definite time limit. It stands for the highest value encountered during a period of a month, a year, or a number of years, whatever the case may be. It can also stand for the highest value found in any one single month over a period of years. Unless otherwise stated the whole year in question is meant. For example, HW 1926/1935 means that the given figure represents the highest water level encountered during the years from 1926 to 1935. Another example: HW 1926/1935 means that the given figure represents the highest water level encountered in all the winters between 1926 and 1935. Another example: HW 1926/1935 means that the given figure represents the highest water level encountered in all of the January months between 1926 and 1935.
c. The mean high value (MH) in the space of time covered.	MHW	MHWThw	MHTw	MHQ	MHq	MHT	c. The mean high value of the average high value as derived by adding the highest values of each of the years or months of the series of years or months in question and dividing this sum by the number of years or months, as the case may be. Unless otherwise stated the whole year (every month in the year) in a series of years is meant. For example, MH 1926/1935 stands for the mean or average figure for all the highest discharges encountered between 1926 and 1935. Another example: MH 1926/1935 stands for the mean or average discharge for all the February months between 1926 and 1935.
d. The mean value (M) (average) in the space of time covered.	M	MThw	MTw	MQ	Mq	MT	d. The mean value or the average value of all measurements taken over a period of time at any one existing station. For example: MT 1937 stands for the average temperature as derived from the 365 observations taken in 1937. Another example: MT 1926/1935 on the other hand, stands for the mean or average of all the mean water temperature readings taken between 1926 and 1935. Another example: So, MT 1926/1935 stands for the mean or average of all the mean summer water temperatures between 1926 and 1935. Another example: M 1926/1935 stands for the mean water temperature as derived from the mean water temperature of all the March months between 1926 and 1935.
e. The mean low value (ML) (mean minimum) in the space of time covered.	MHW	MHWThw	MHTw	MLQ	MLq	MHT	e. Refer to explanation in column a.
f. The lowest value (L) encountered in the space of time covered.	LW	LWThw	LTw	LQ	Lq	LT	f. Refer to explanation in column b.
g. The lowest low value (LL) ever known or encountered. (The absolute minimum).	LLW	LLWThw	LLTw	LLQ	LLq	LLT	g. Refer to explanation in column a.

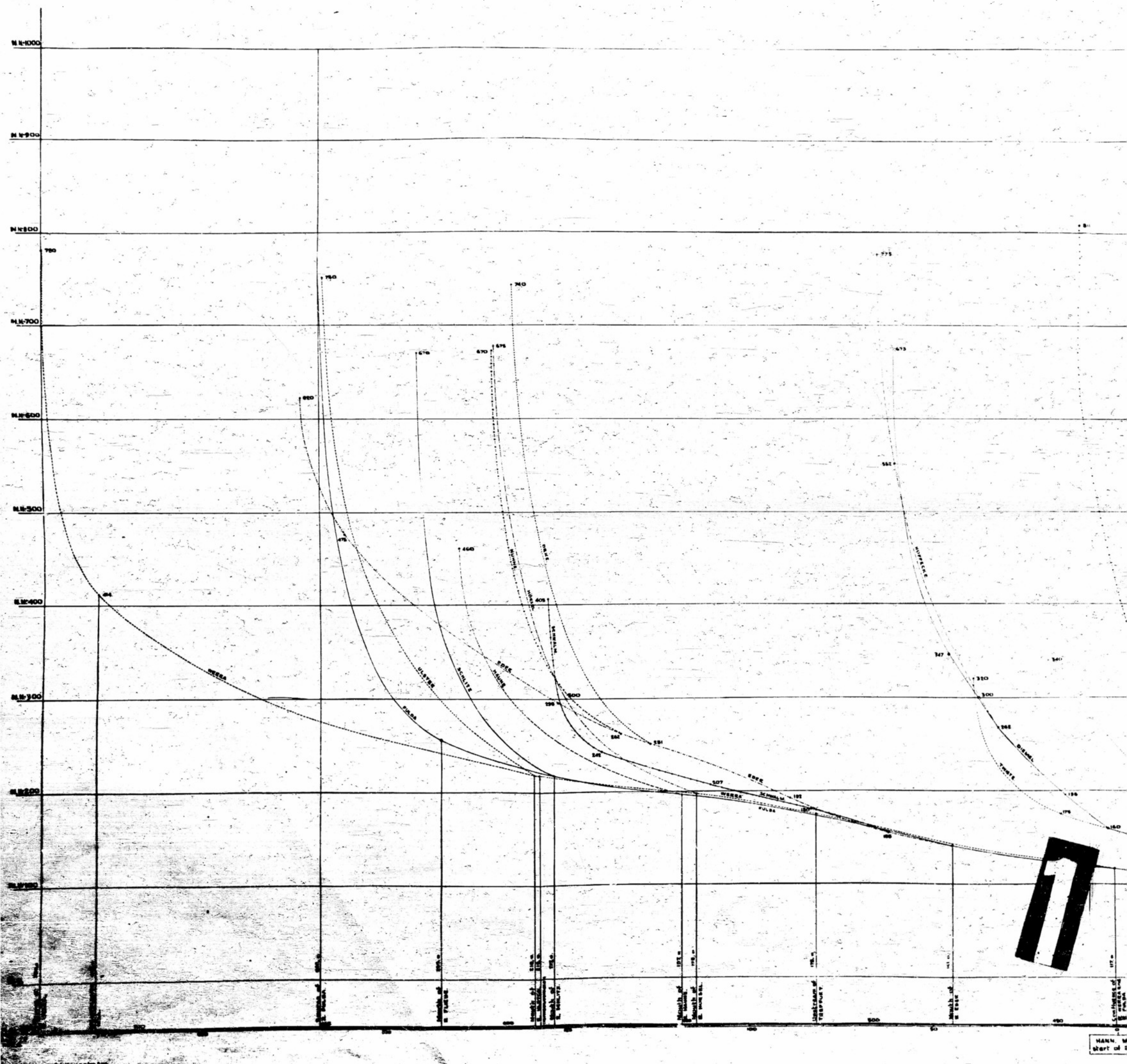
WESER & EMS RIVER BASIN

GENERAL MAP FOR CONTROL OF WATER IN RIVERS & CANALS IN WAR

This map is from "Stromgebiet der Weser und Ems - Einwirkung auf die Wasserführung" - Generalkommando X-AK (Mil Geo) Hamburg - 1937





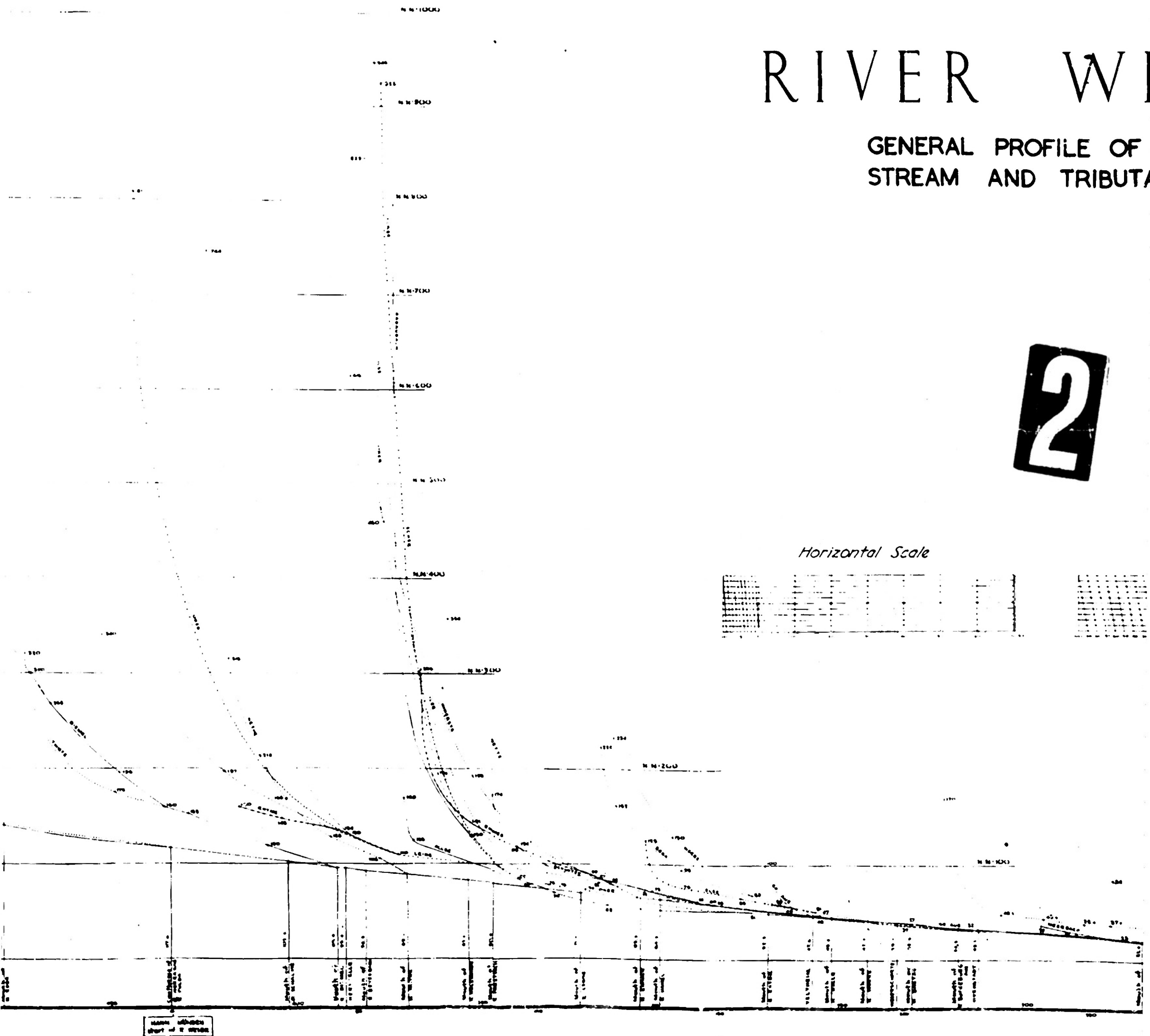


RIVER WIL

GENERAL PROFILE OF STREAM AND TRIBUTA



Horizontal Scale



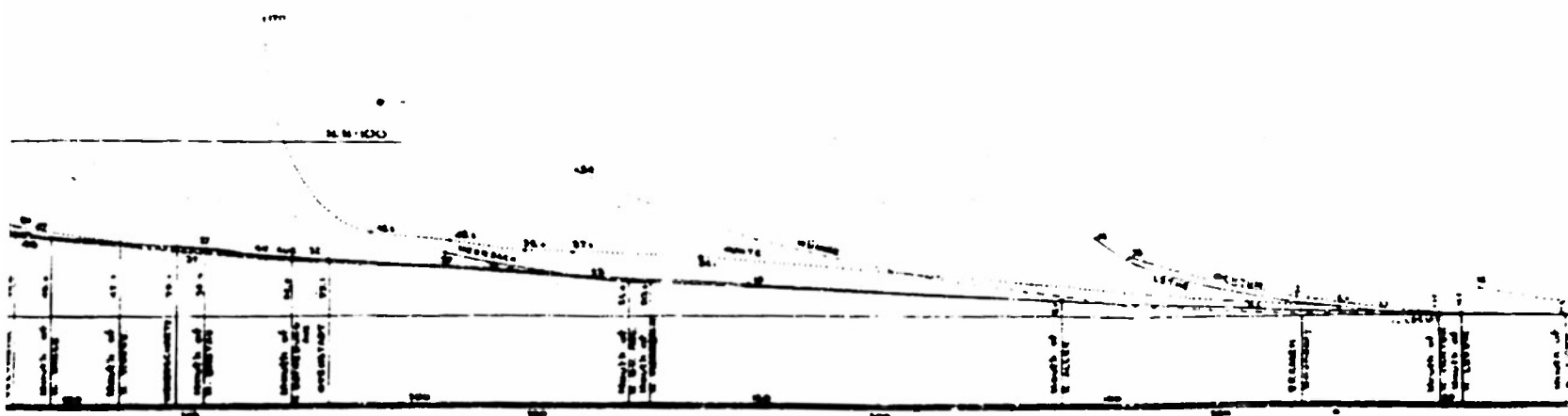
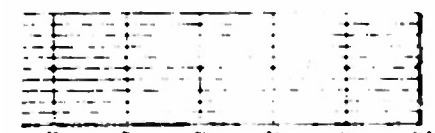
VER WESER

GENERAL PROFILE OF MAIN
STREAM AND TRIBUTARIES

3

Horizontal Scale

Vertical Scale



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SYSTEM," CE. HQ. B.A.O.R. 1946.

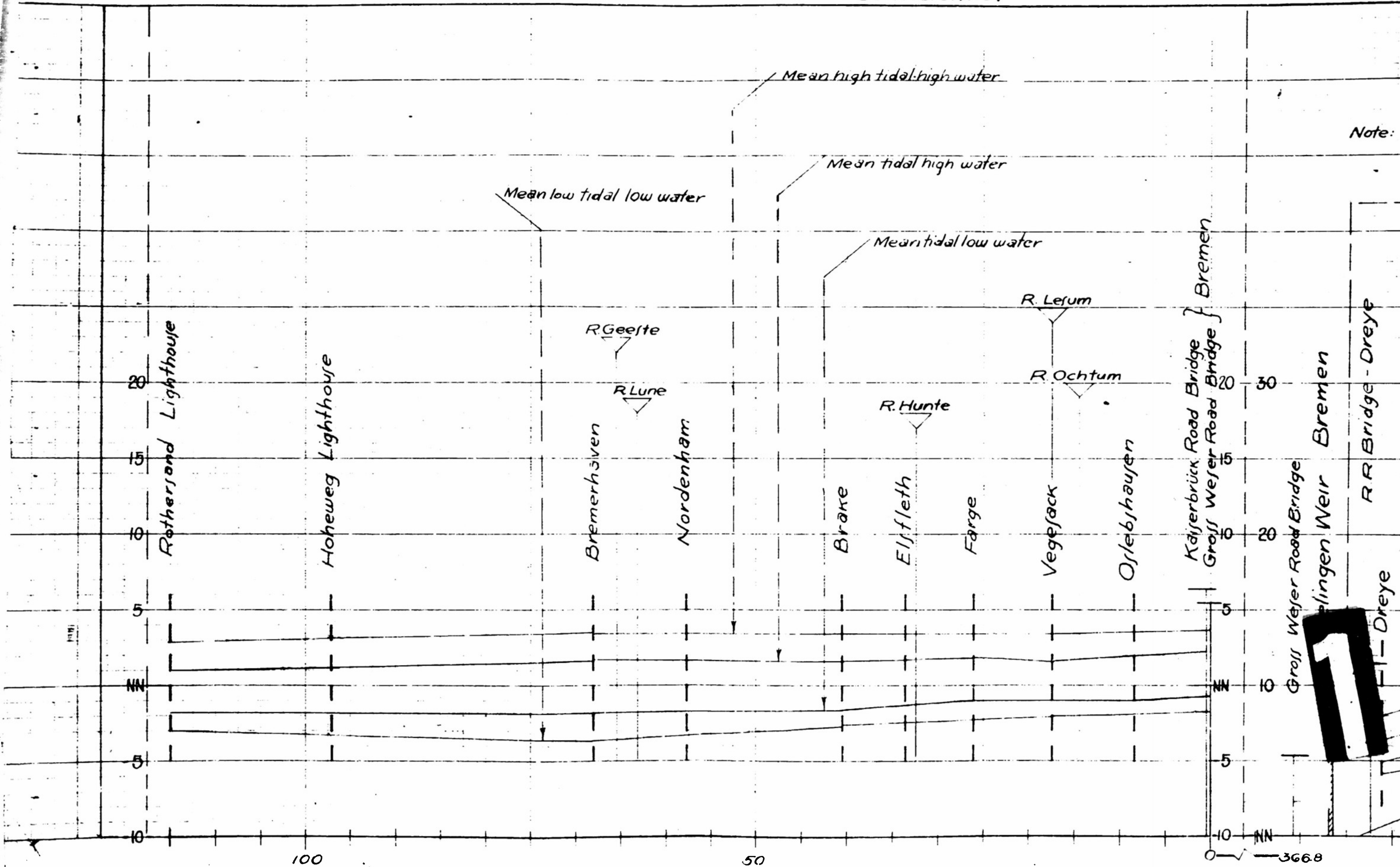
WESER RIVER
GENERAL PROFILE

Washington District Corps of Engineers
Prepared by E.B.E. Date 2/15/52
Drawn by: ---

Exhibit 4

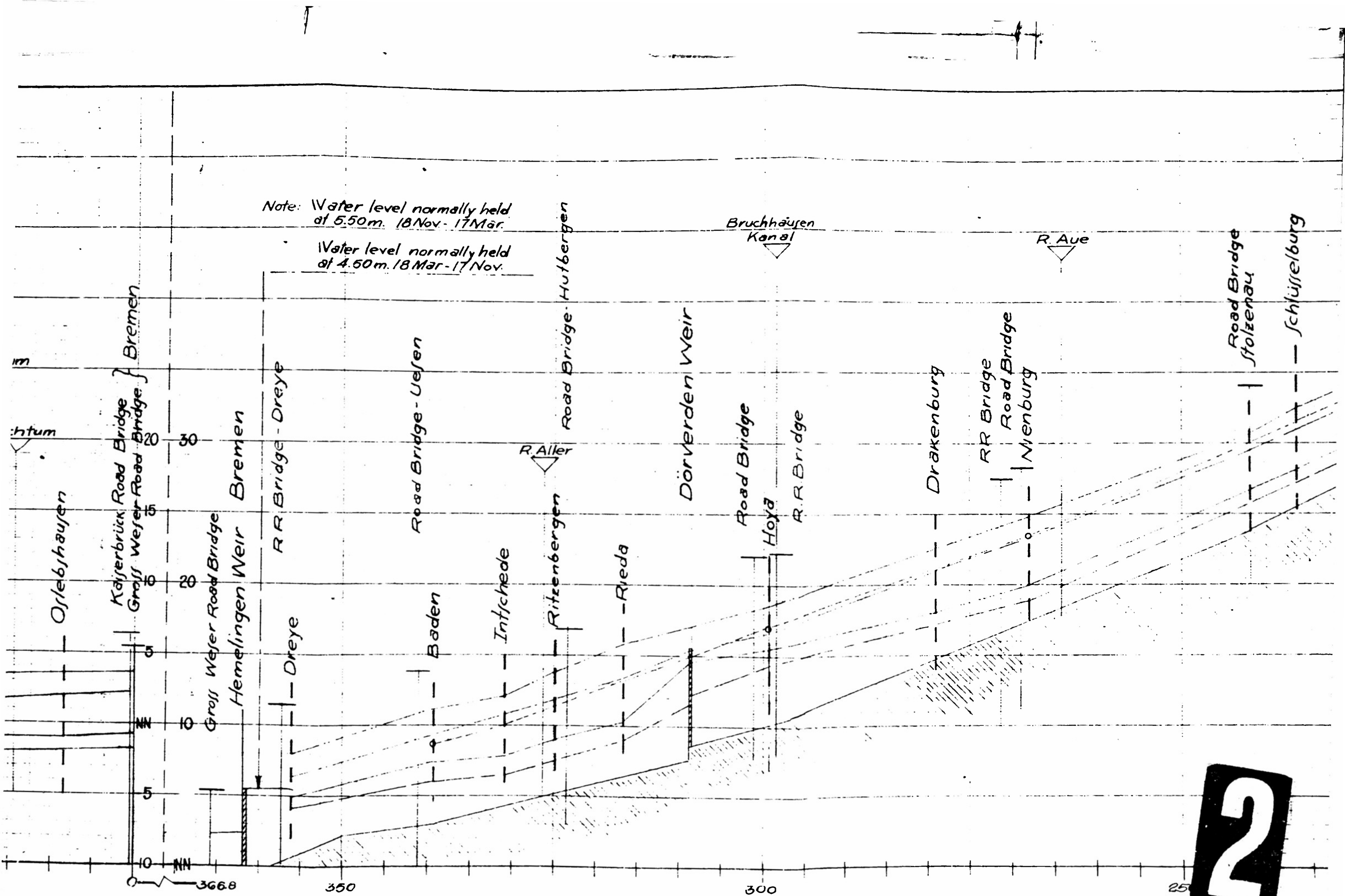
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Note:



RIVER Km BELOW BREMEN

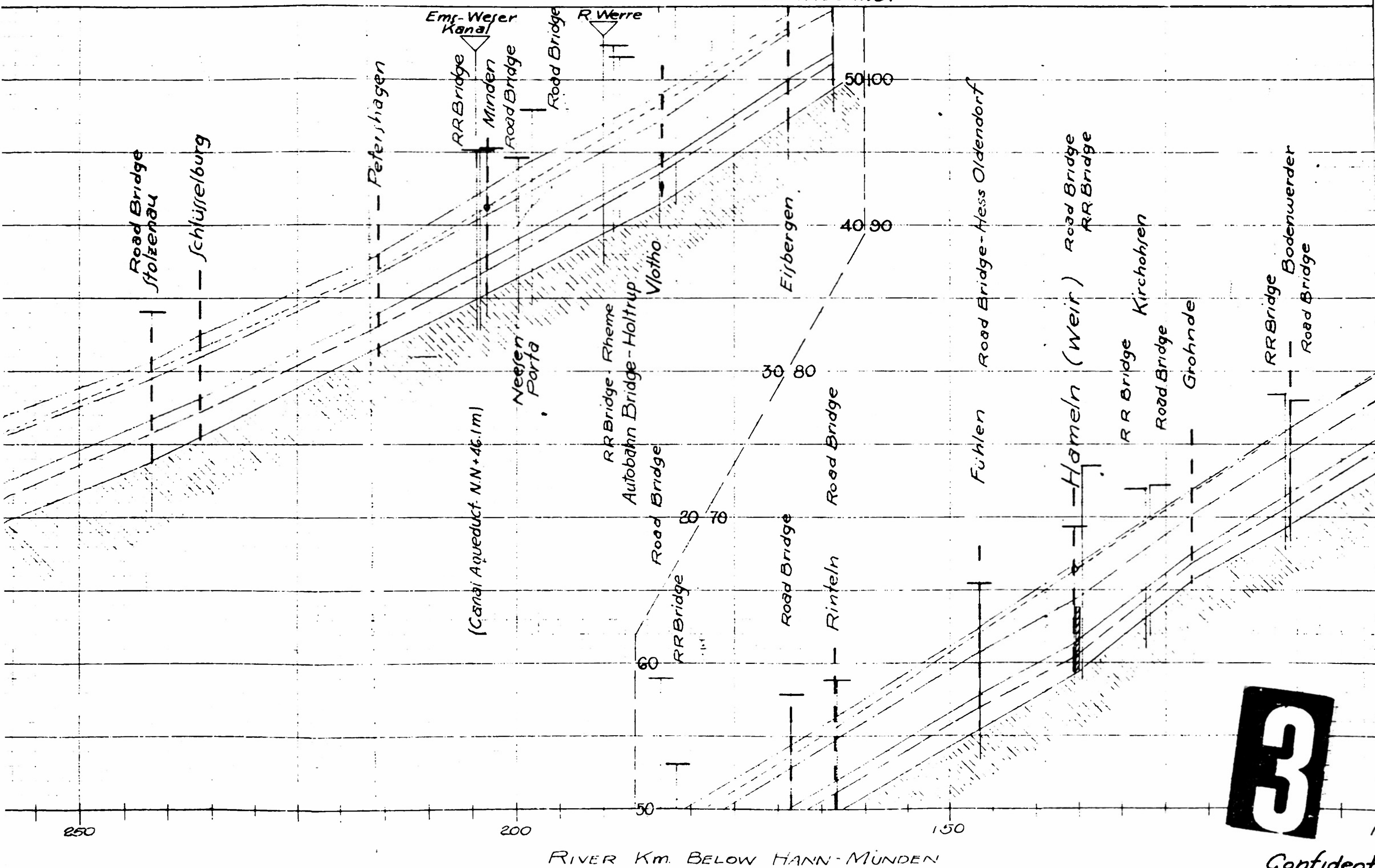
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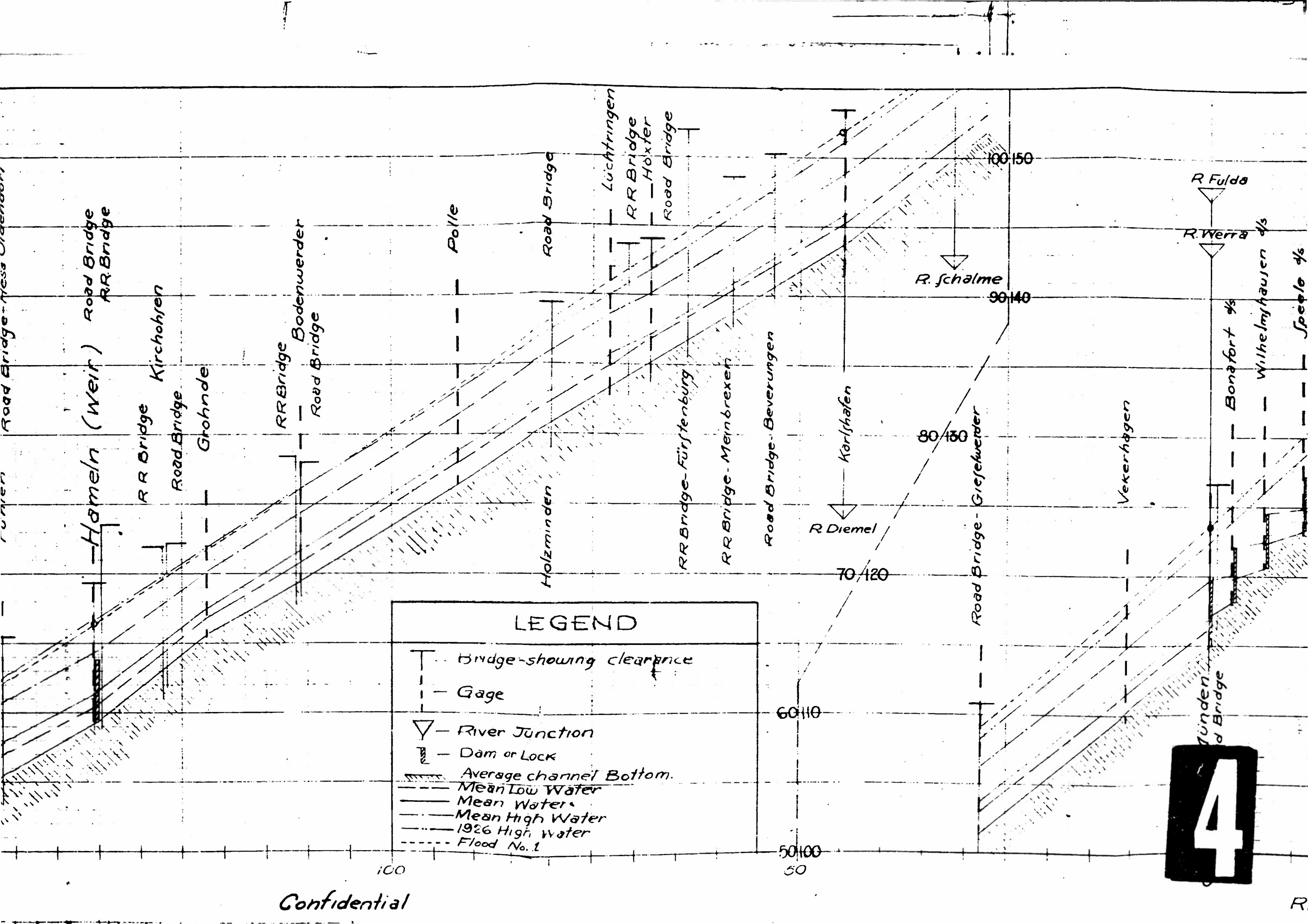


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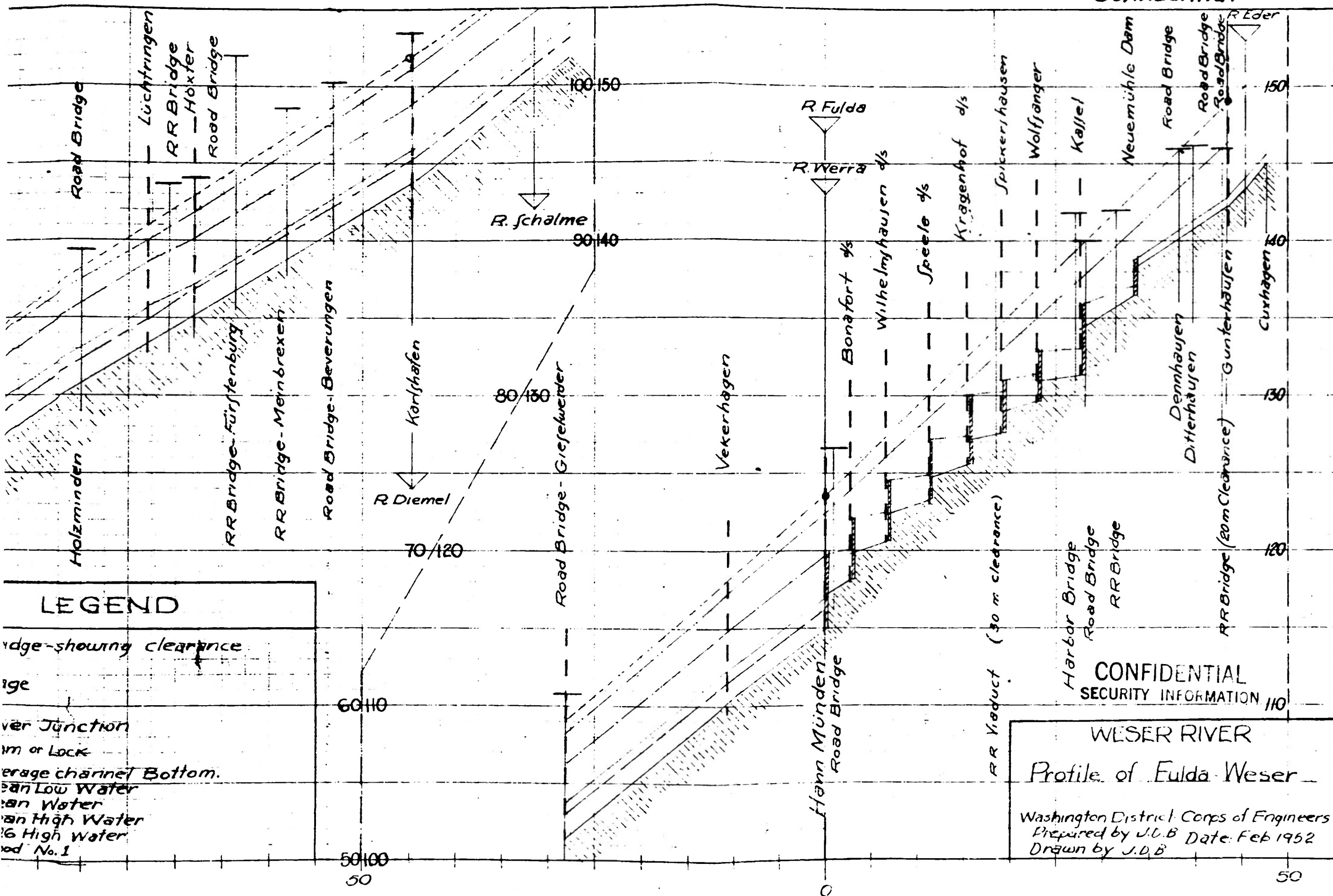
2

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LEGEND

Bridge-showing clearance
 ge
 ver Junction
 m or Lock
 erage channel Bottom.
 an Low Water
 an Water
 an High Water
 6 High Water
 od No.1

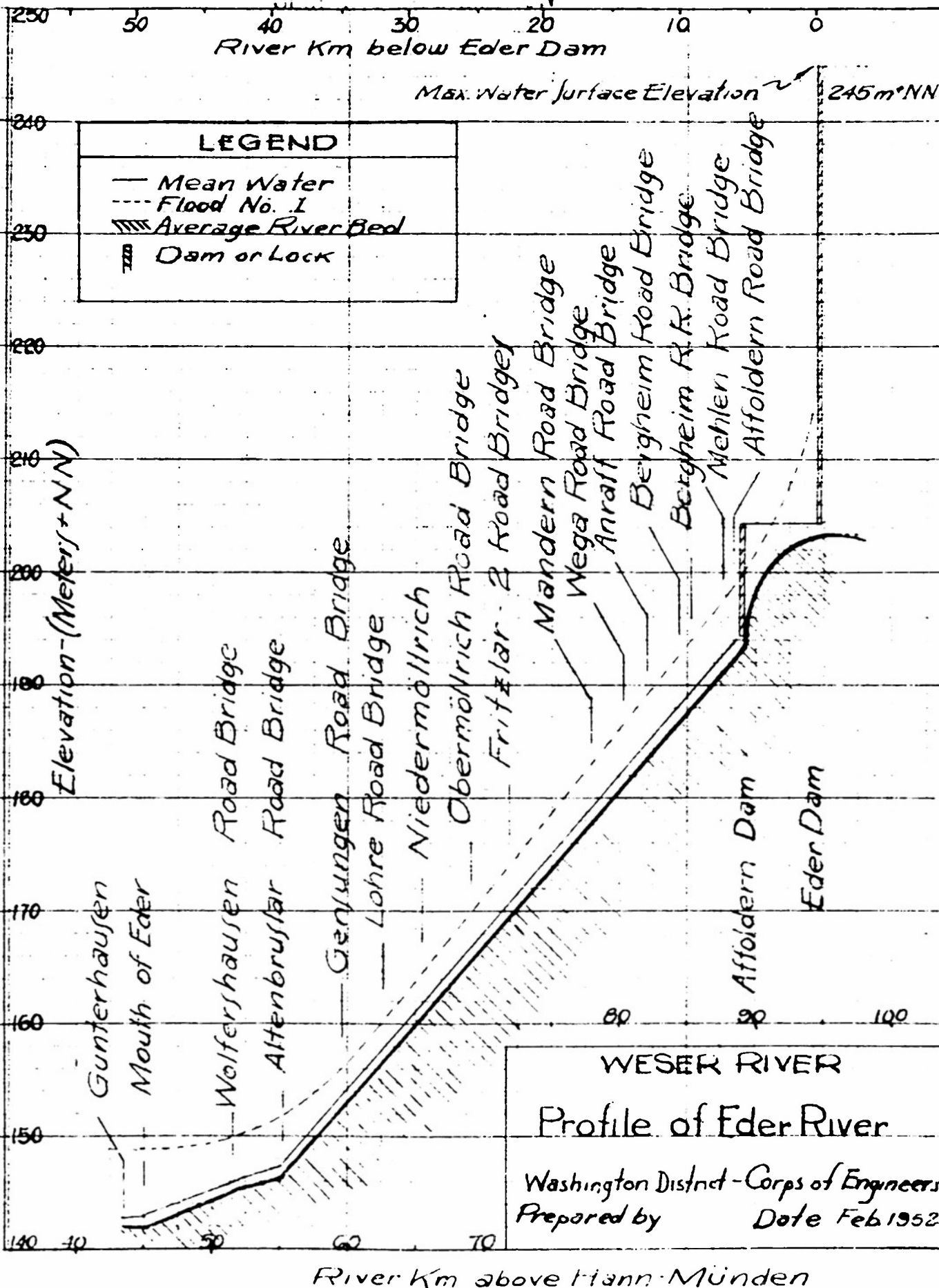
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WESER RIVER
 Profile of Fulda-Weser
 Washington District Corps of Engineers
 Prepared by J.C.B. Date: Feb 1952
 Drawn by J.D.B.

RIVER Km ABOVE HANN-MÜNDEN
 Exhibit No 5

5

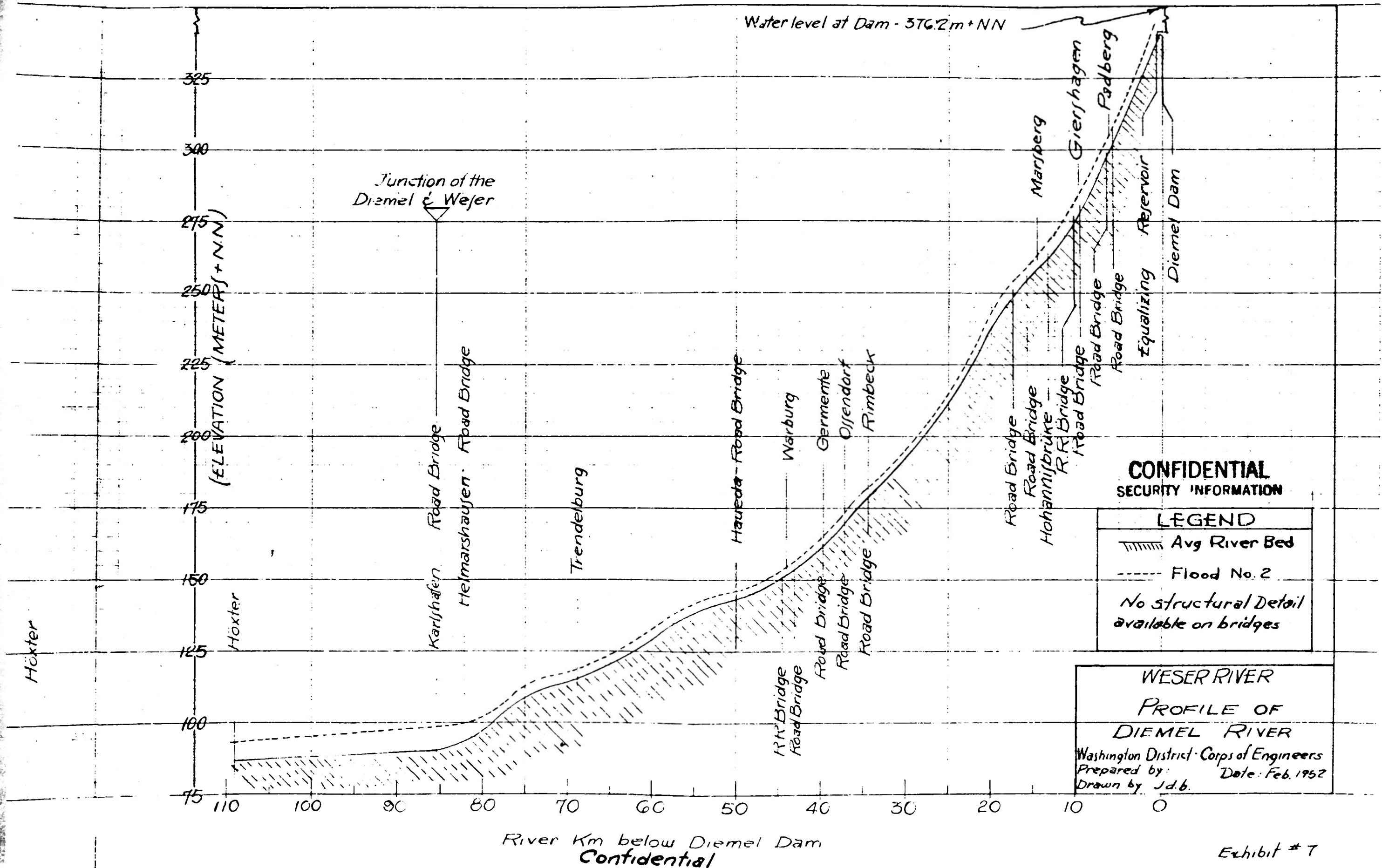
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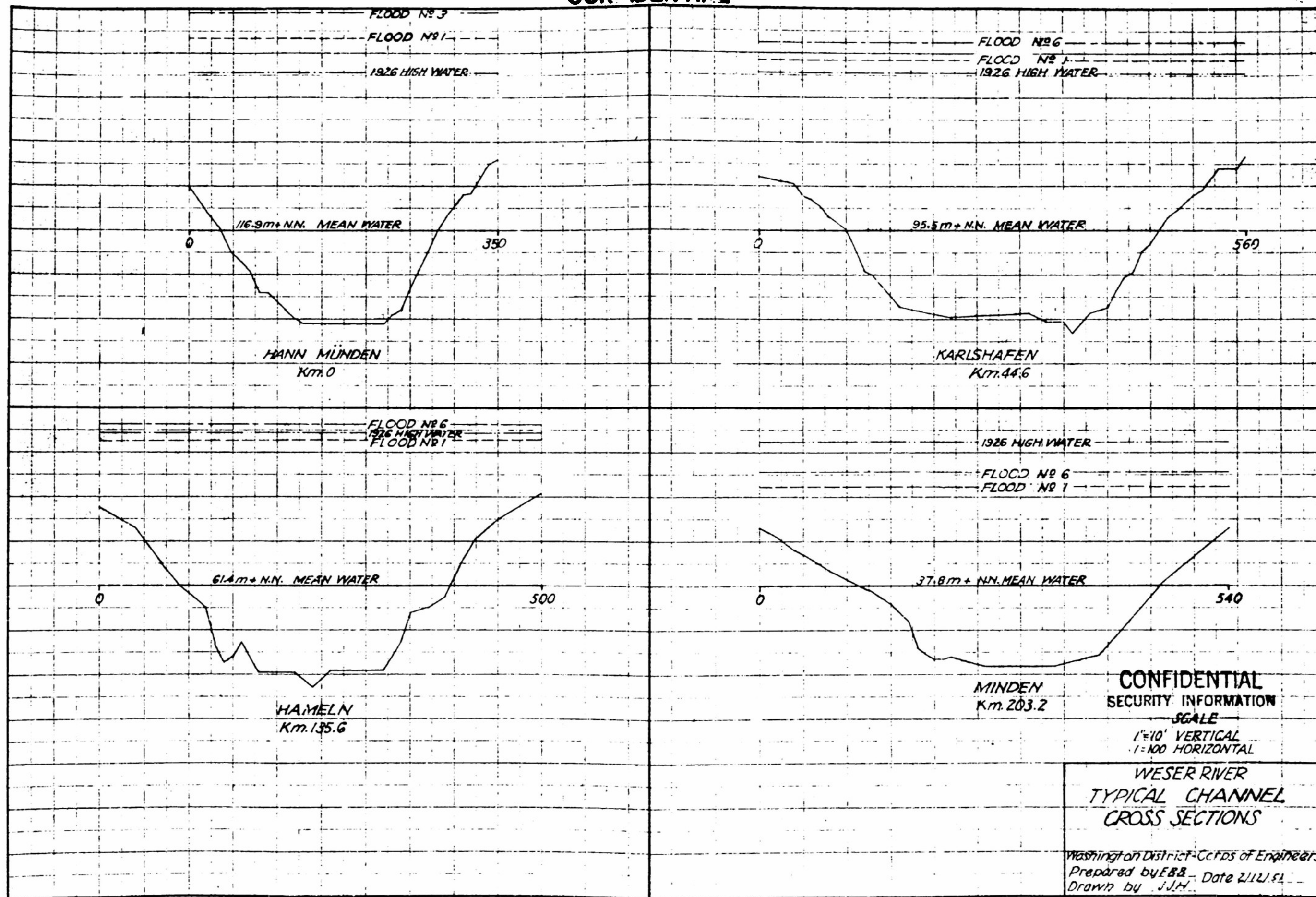
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Exhibit No. 6

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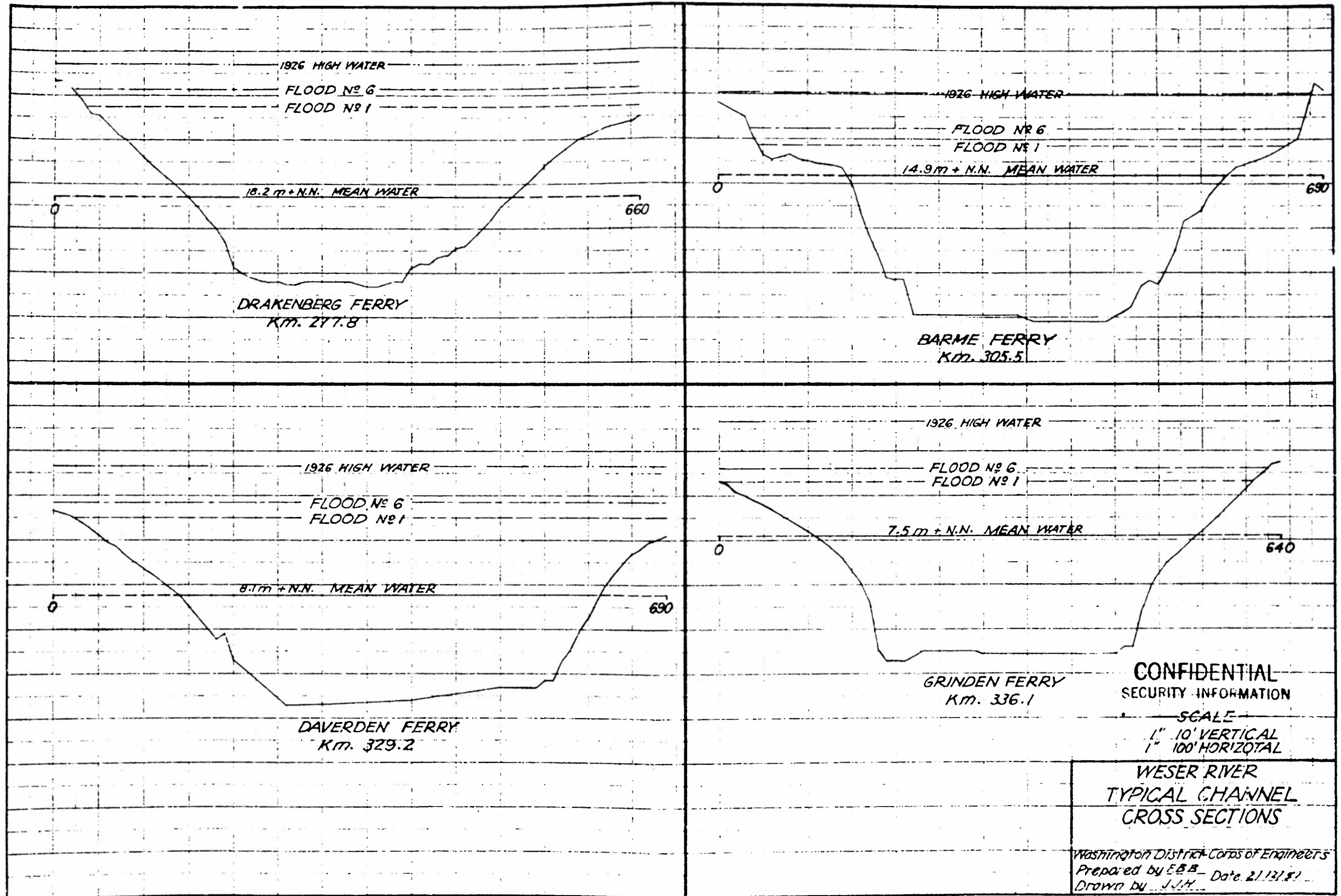
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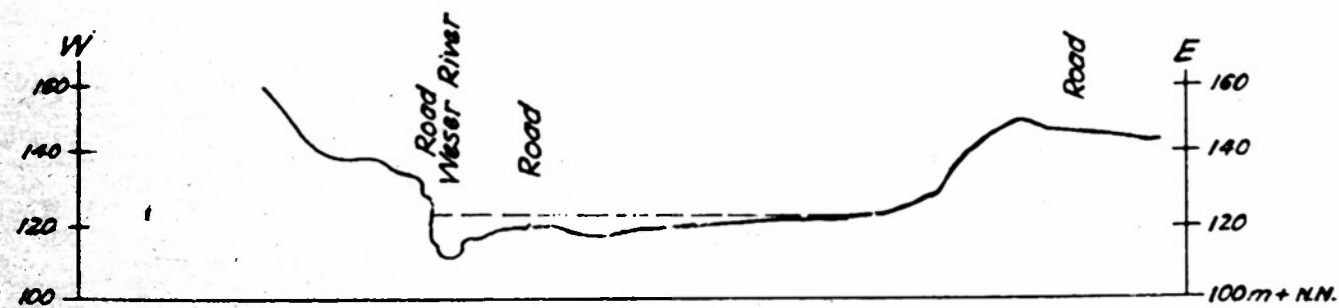
Exhibit 8

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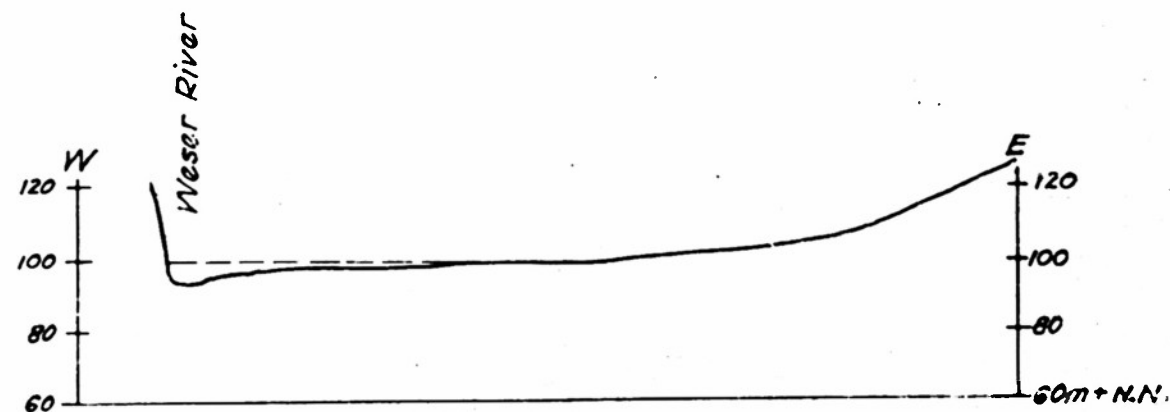


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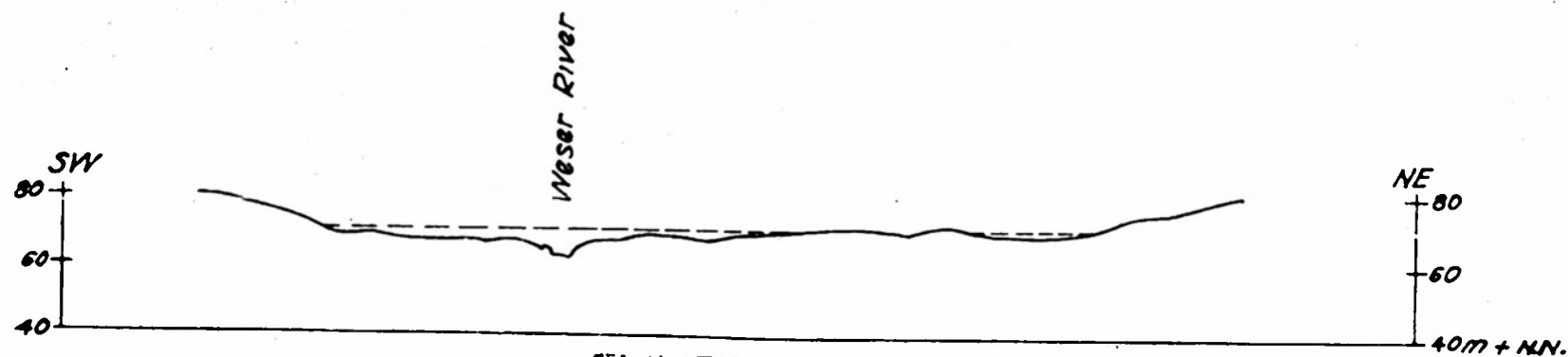
Exhibit 9



GIMTE
2.5 Km. below Hann Münden



near BEVERLINGEN
51.2 Km. below Hann Münden



EMMERN
127.8 Km. below Hann Münden

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— SCALE —
1:2000 VERTICAL
1:20,000 HORIZONTAL

WESER RIVER
TYPICAL VALLEY
CROSS-SECTIONS

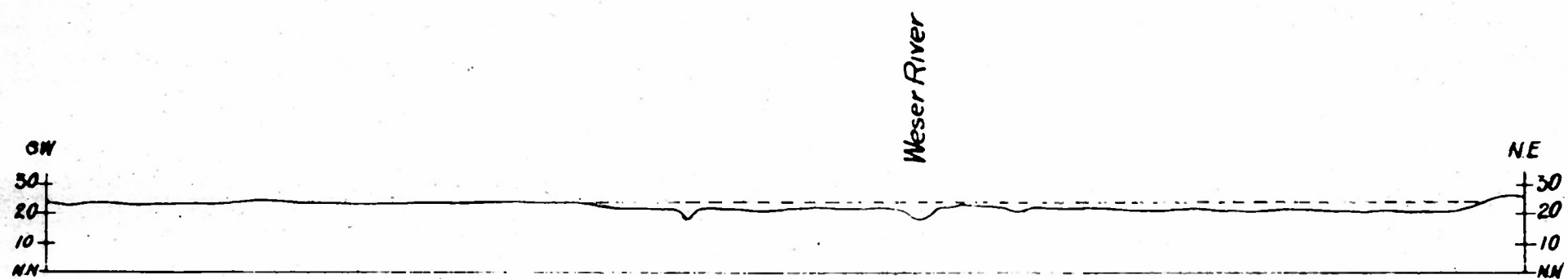
Washington District Corps of Engineers
Prepared by: J.H. Date: Feb. 1952
Drawn by: J.H.

Exhibit 10

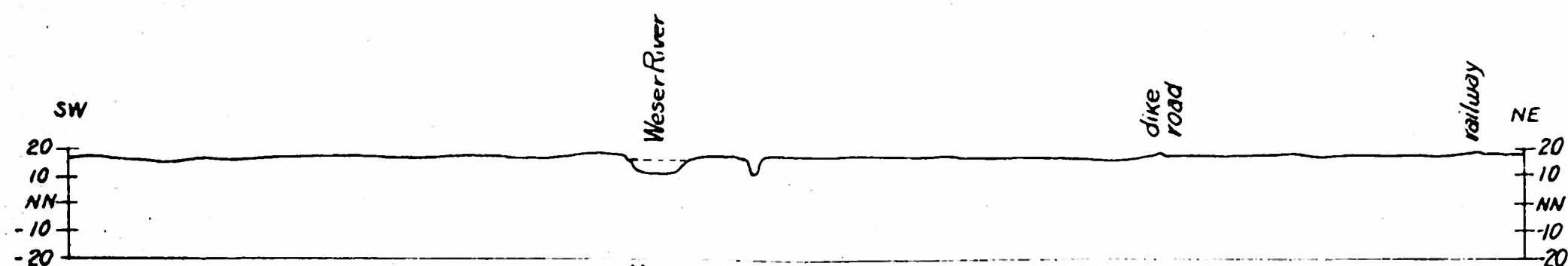
LEGEND
----- Flood No 1



NEESEN
200.5 Km. below Hann. Münden



NIENBURG
265.2 Km. below Hann. Münden



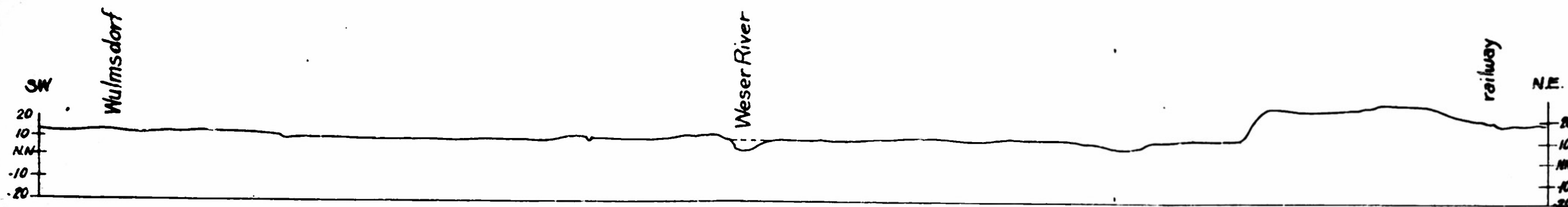
DÖRVERDEN
308.8 Km. below Hann. Münden

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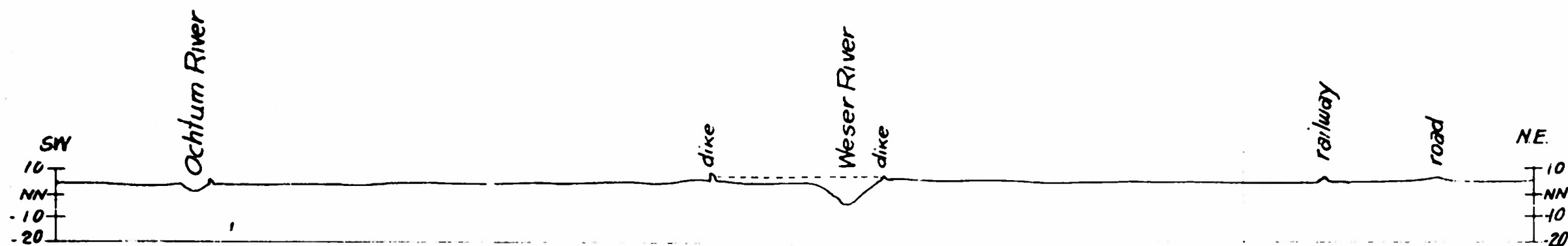
LEGEND
Flood 1 - - - - -

SCALE
Vertical - 1:1000
Horizontal - 1:10,000

WESER RIVER
TYPICAL VALLEY
CROSS-SECTIONS
Washington District Corps of Engineers
Prepared by - - - - - Date Feb. 1952
Drawn by J.H. - - - - -



WULMSTORF
334.1 Km below Hann. Münden



ARSTEN
358.3 Km. below Hann. Münden

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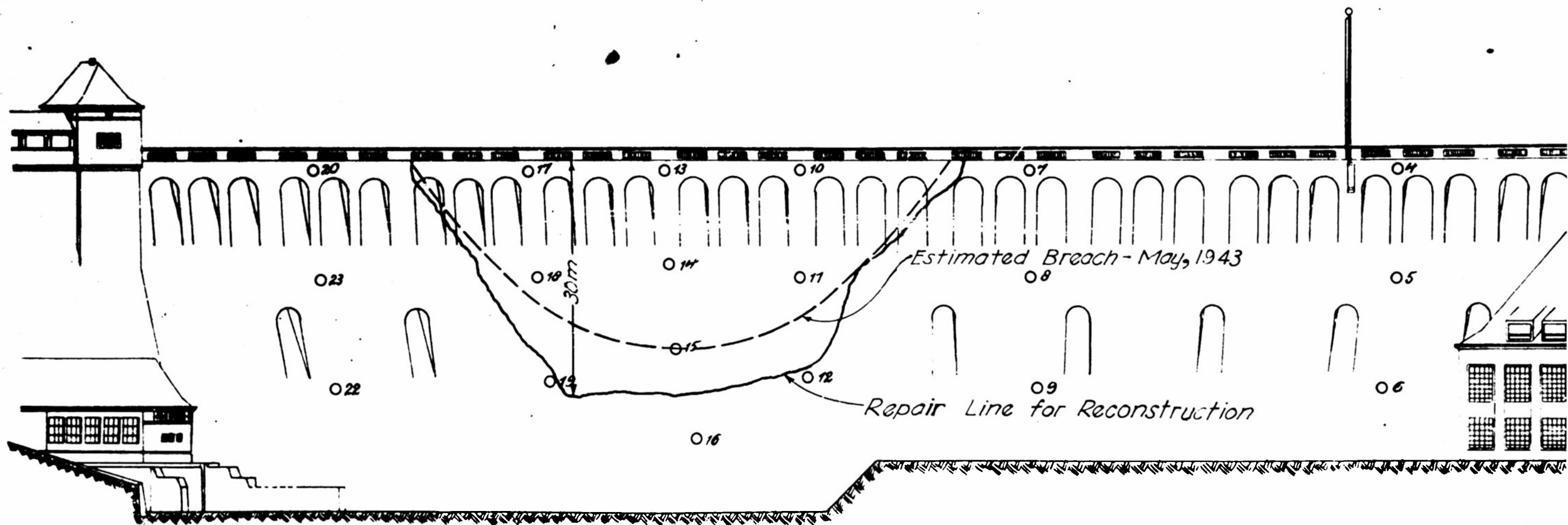
LEGEND
Flood 1 - - - - -

SCALE
Horizontal - 1:10,000
Vertical 1:1,000

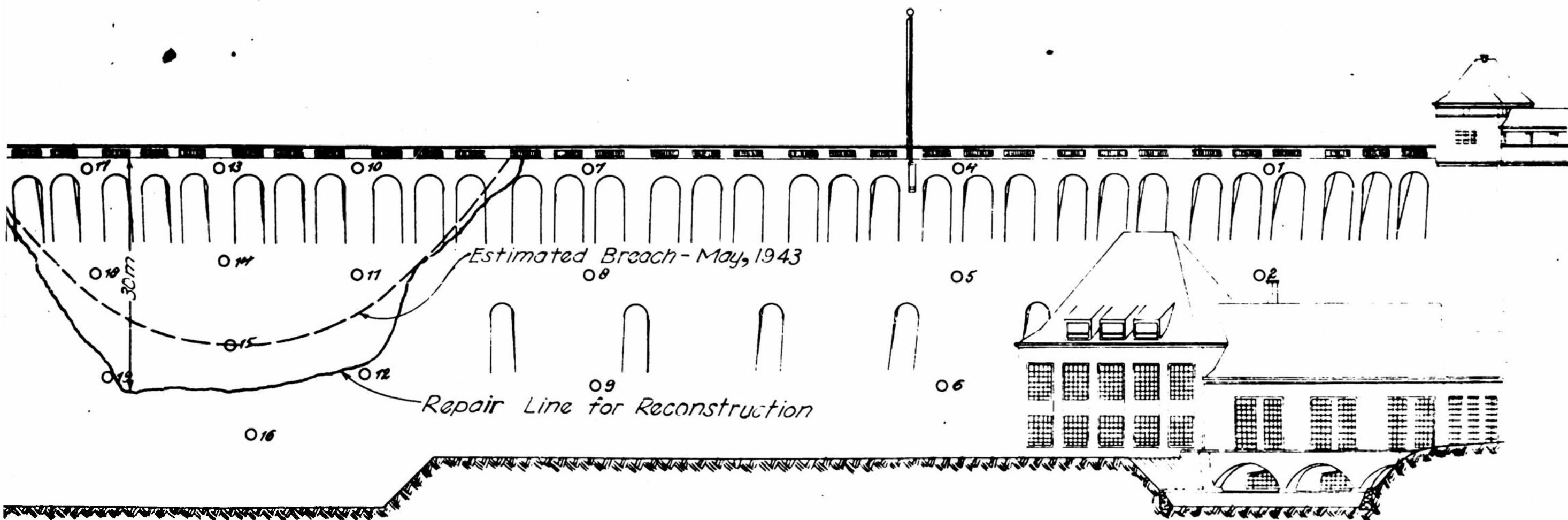
WESER RIVER
TYPICAL VALLEY
CROSS-SECTIONS

Washington District Corps of Engineers
Prepared by - - - - - Date Feb. 1952
Drawn by - J.B. -

Exhibit 12



EDER DAM ELEVATION
LOOKING UPSTREAM

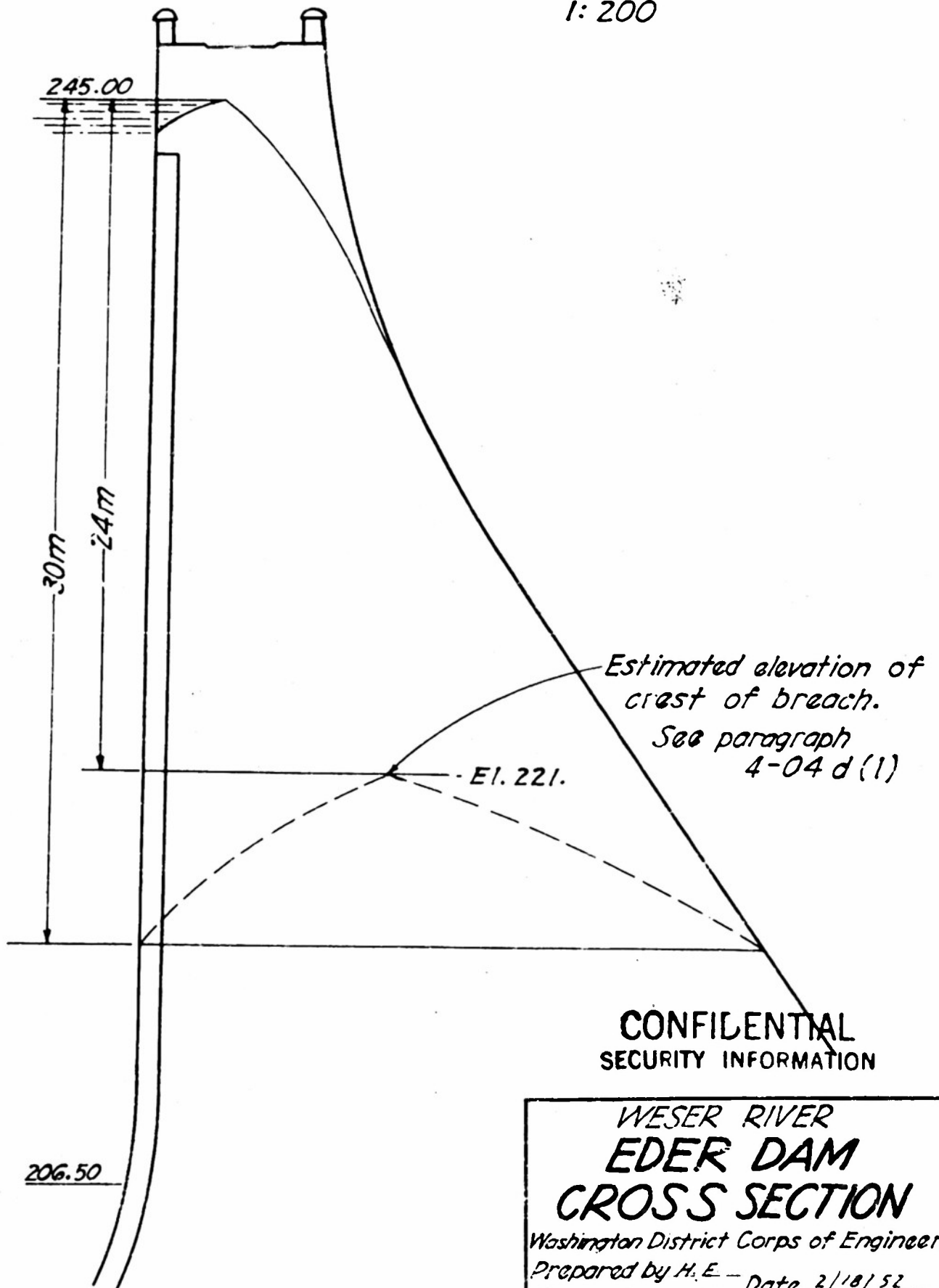


EDER DAM ELEVATION
LOOKING UPSTREAM

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EDER DAM
ELEVATION

SCALE
1: 200



WESER RIVER, CROSS SECTION OF DIEMEL DAM, 1925

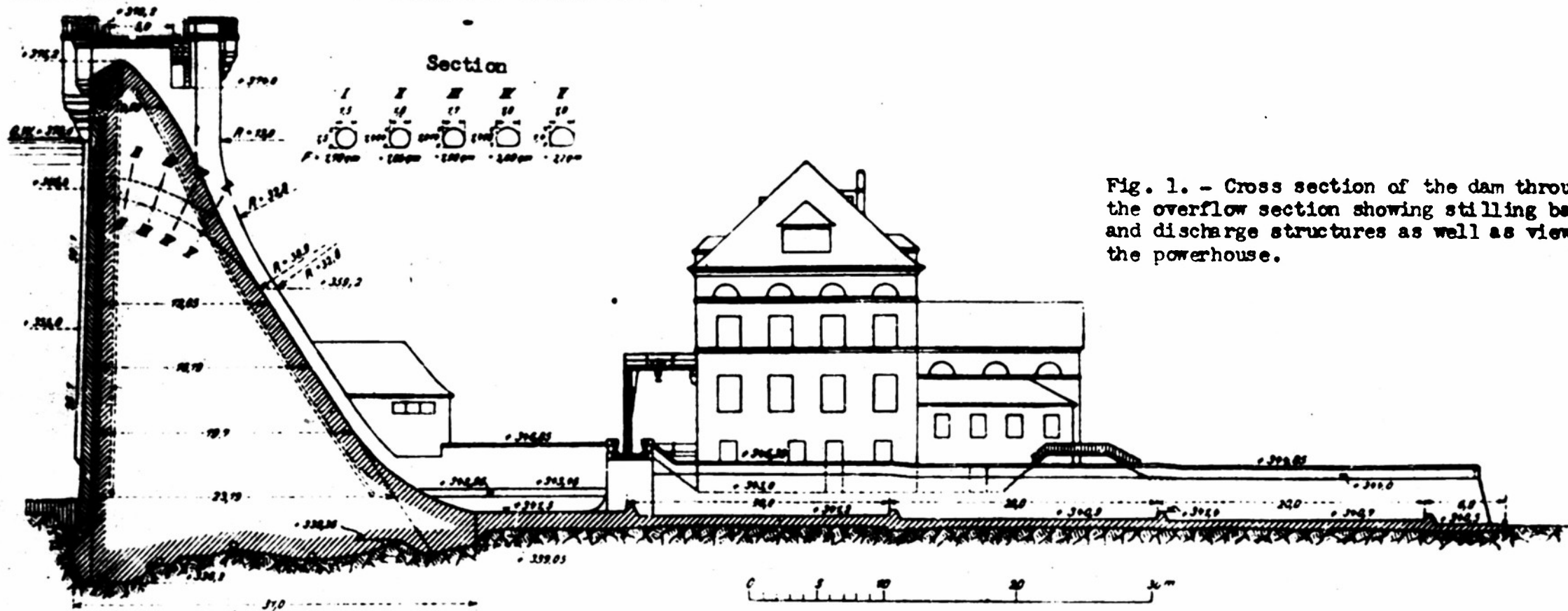


Fig. 1. - Cross section of the dam through the overflow section showing stilling basin and discharge structures as well as view of the powerhouse.

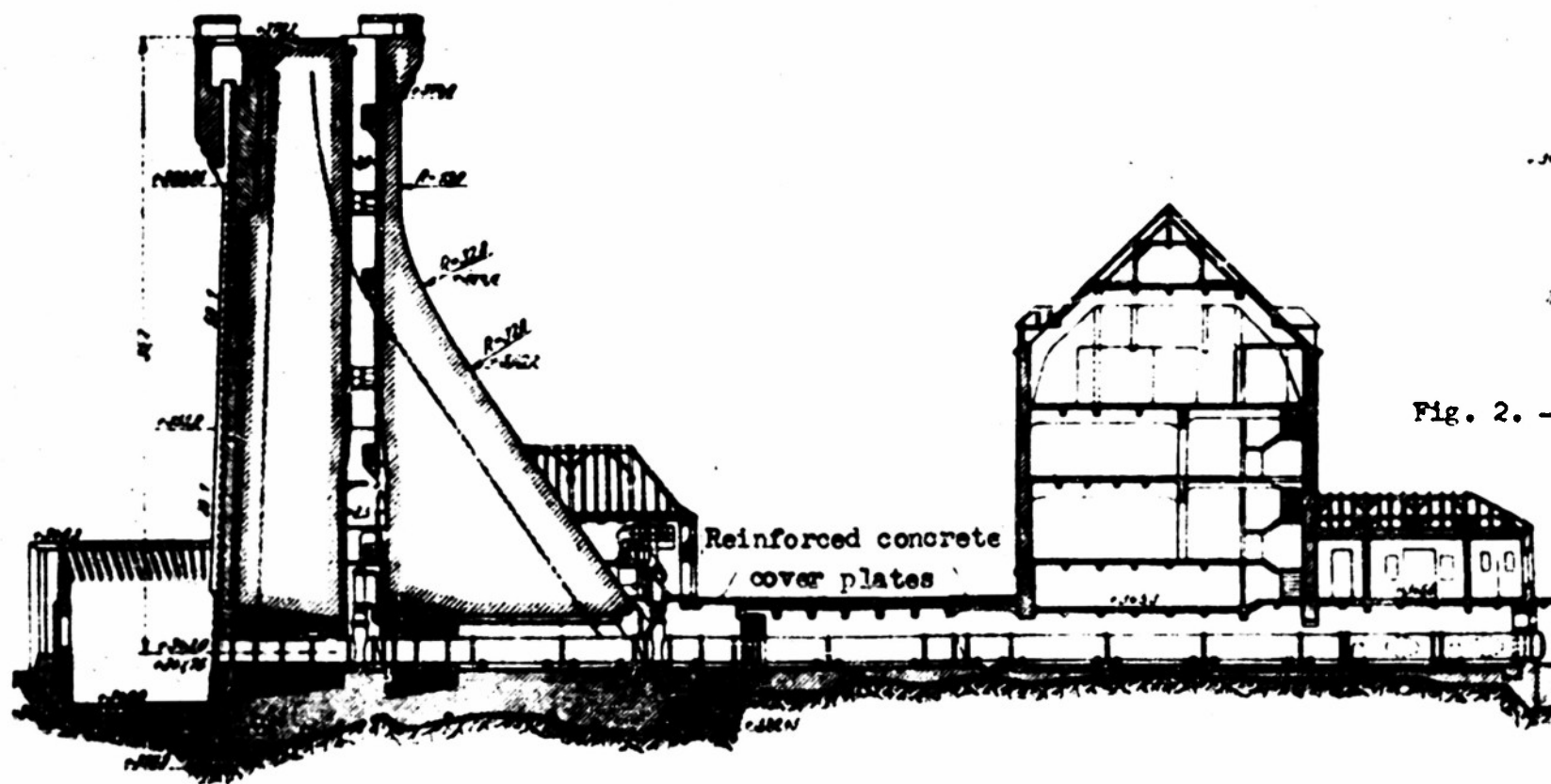


Fig. 2. - Cross section through the powerhouse (view looking upstream)

WESER RIVER,
CROSS SECTION
DIEMEL DAM
Washington District Corps of Engineers
Prepared by JB. - Date Feb. 1952

SWEET L

NOT TO SCALE.

NOTES.

- [illegible]

A graph of a function on a coordinate plane. The curve starts at the origin, rises to a peak, and then descends. A vertical dashed line is drawn from the peak down to the x-axis. A single dot is marked on the curve, to the left of the peak.

A line graph with a single data series. The line starts at a low point on the left, rises steadily to a peak, and then begins to decline. A vertical dashed line is drawn at the point where the line starts to curve downwards. The number '10' is written vertically along this dashed line. The number '93773' is written in the top left corner of the graph area.

75634

[illegible]

WESER RIVER
LEVEE DATA

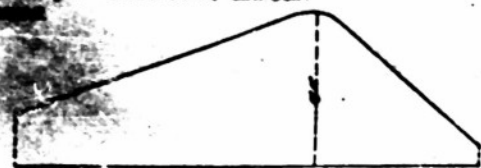
Washington Post-News Service
 Prepared by: [illegible] Date: 10.15.52
 Original

Exhibit 15

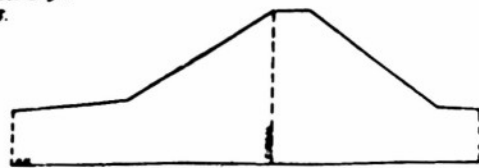
NOT TO SCALE.

NOTES

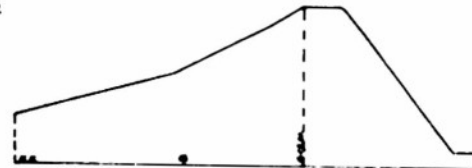
- [illegible]



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PAGE 34 SERIAL 68
END 52



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H.E. 067500.



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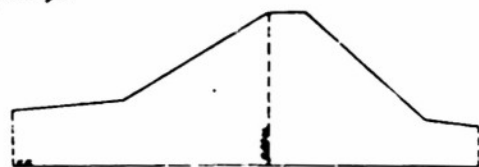
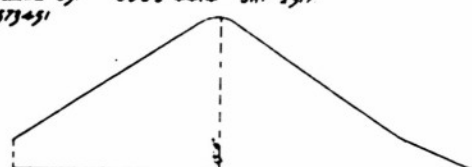


FIG 37 SERIAL 69 GSGS 4414 SMT 2517
MR 0579451



FILE NO. SERIAL 57 ESC? A-19, INT. DING.
ACR 25050

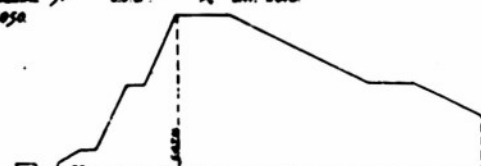


FIG 31 SERIAL 60. 65GS 4414. SNT 2717
MR 2575209.

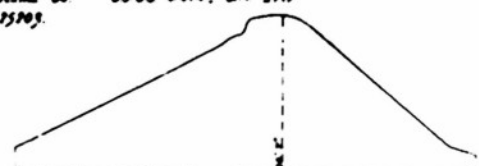
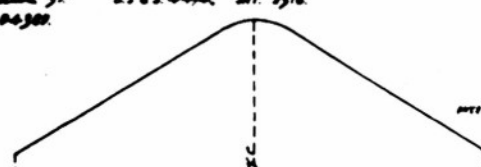


FIG 3B SERIAL 63
KIM 63.



FILE # 22044 37 6562-4410 INT. 0510
AIR 2404300.



PAGE 32 SERIAL 60
END 94

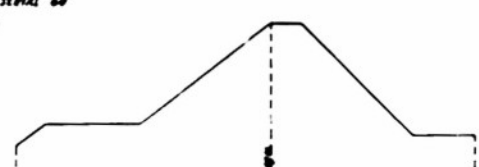
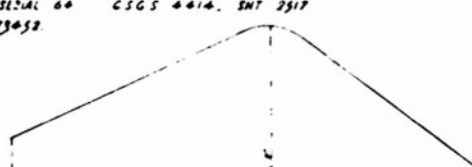
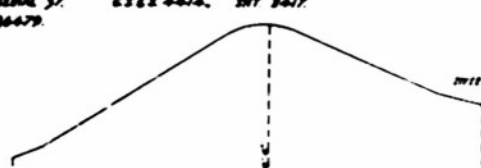


FIG 39 SERIAL 60 CSGS 4414. SNT 2517
MR 2578452



PAGE DE SERIAL 37. GSER 4414. INT 2417
NR 2396-679.



THE SS SERIAL 61 GSGS 4414. INT 2617
MR. B. W. 200

FIG 40
TIA 10

PG 97 SERIAL 97 CSOS 4414. INT 2417
MR 25247.

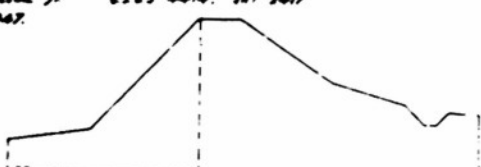


FIG 30 SERIAL 61
PAGE 44

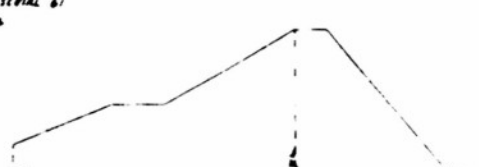


FIG. 41

FILE NO. SERIAL 30 GSCS 4414 INT 2717
 REF 0510106

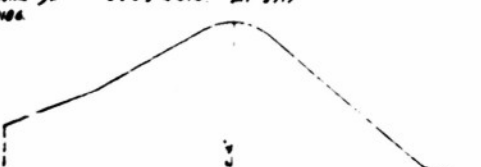
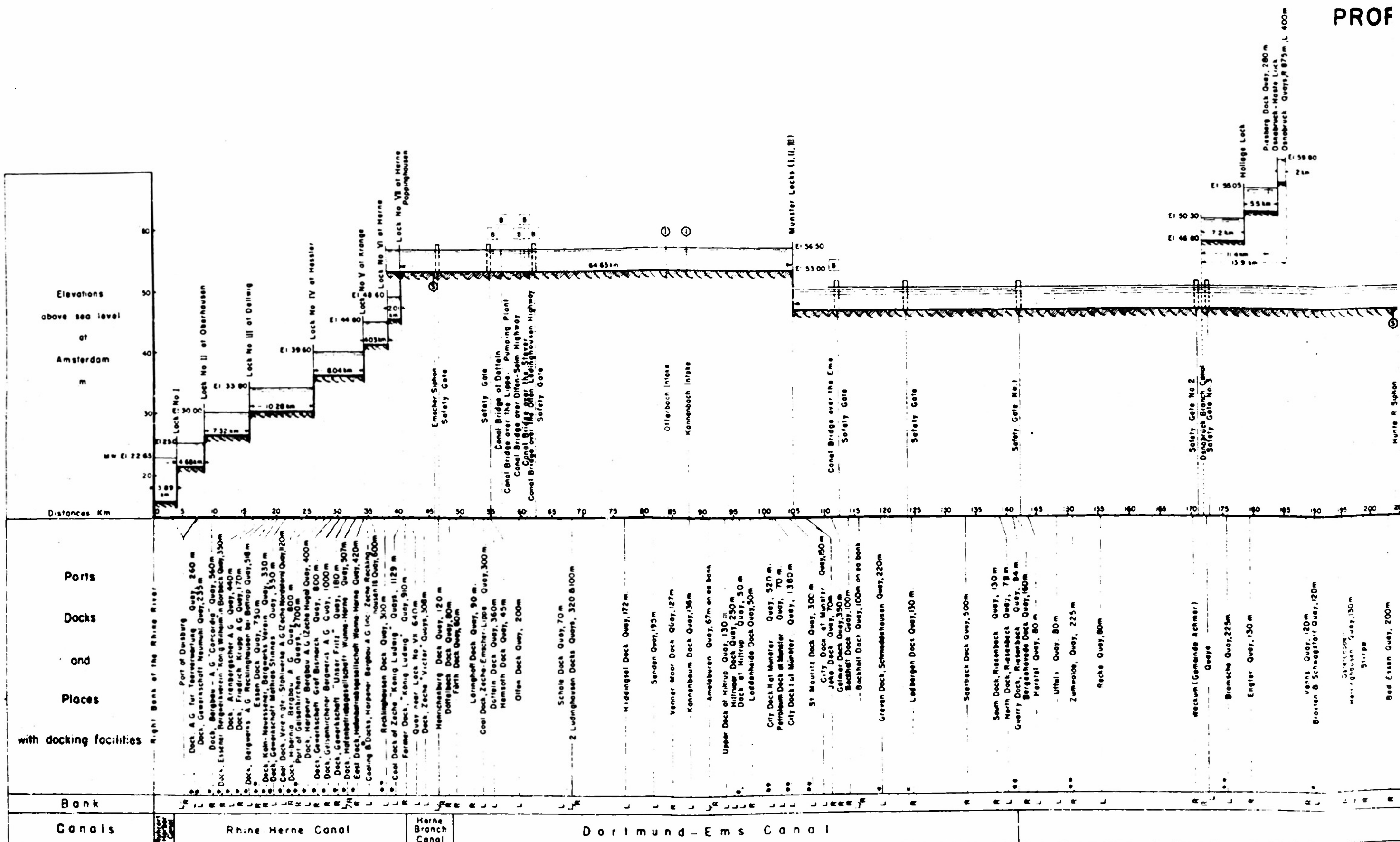


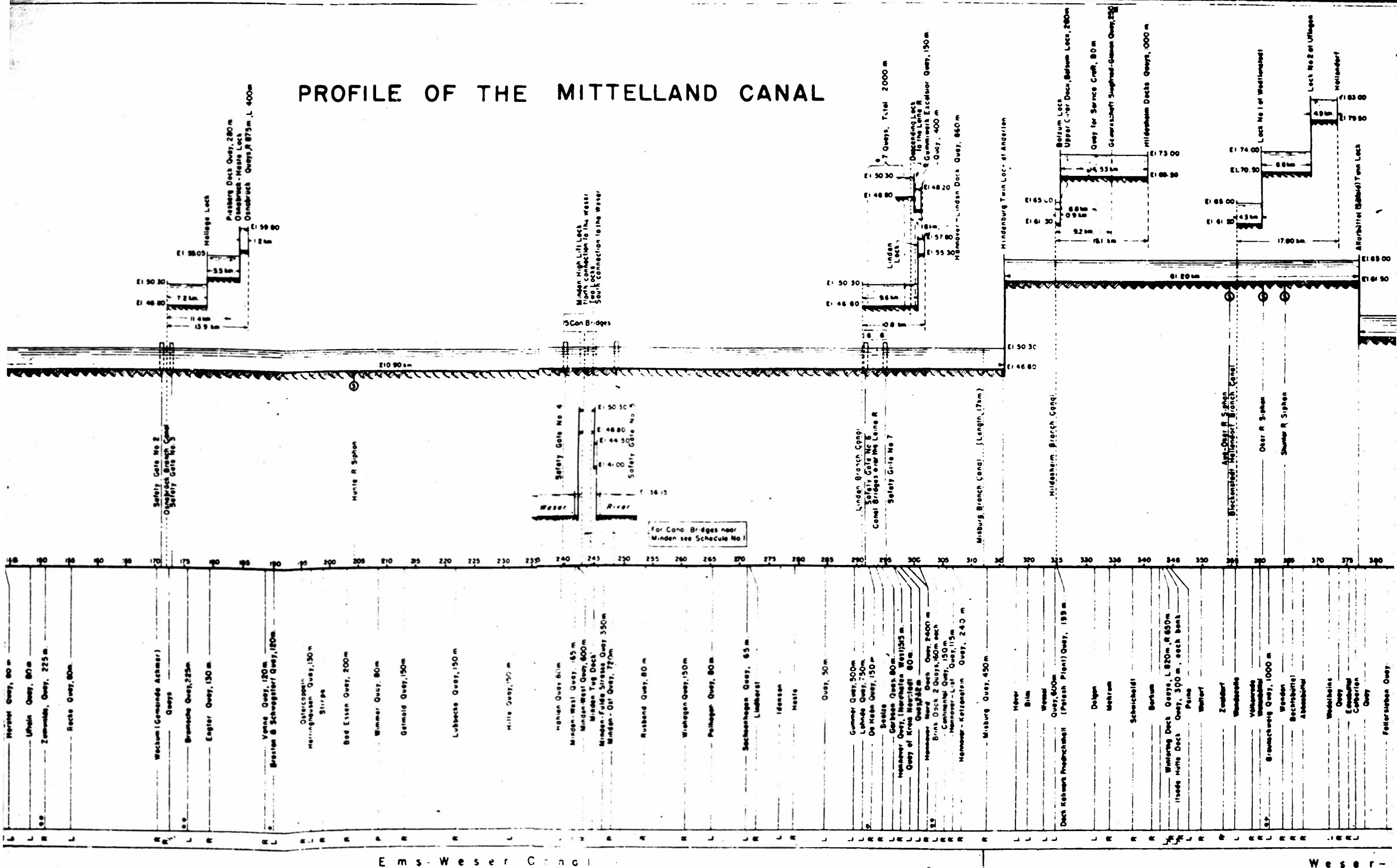
FIG 35 SERIAL 60 GSES 4414 INT 2517
WP 0500309

FIG 43
PLATE 81[illegible]

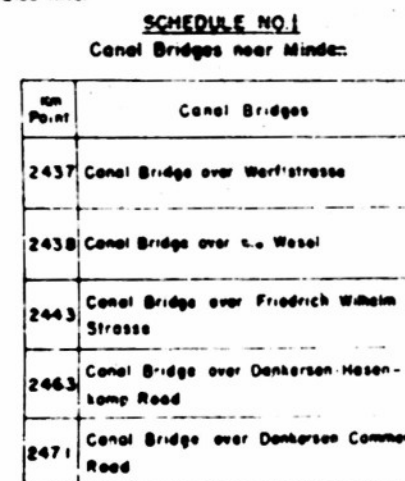
LEVEE DATA



PROFILE OF THE MITTELLAND CANAL



Diagrammatic map of the Mittelland Canal system, showing the route from the North Sea (Nordsee) to the Elbe River, including major canals (Ems-Weser, Weser-Elbe, Dortmund-Ems, Rhine-Weser, Rhine Branch) and locks (Dinslaken, Hattendorf, Rastdorf).



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Washington District Corps of Engineers
Prepared by: E. P. B. Date 2/15/52
Drawn by:

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SECURITY INFORMATION
BRIDGES
CROSSING THE

NO. 27. THE WESER, THE EMS-WESER REGION

KM FROM 0.0	NAME AND LOCATION		TYPE-MATERIAL	CLEARANCE (m)		REMARKS
	RAILROAD LINE	HIGHWAY ROUTE		VERTICAL H. W.	HORIZONTAL OET CROSSING SPAN	
(1)	NO. 27a	AUSSENWESER AND	UTTENWESER (OUTER WESER	AND LOWER WESER)		
111.0	At Bremen	-	Steel	-	2 45.00 -2 18.00	*Over the Grosse Weser and over the Kleine Weser.
112.4 + 0.0	-	NO. 27b. Bremen Kaiser- brück	Steel	-	95.0	*Zero point of the km. system of the inland water route. The Mittelweser (Middle Weser) is officially con- sidered as beginn- ing upstream of the Bremen Dam (km. 8.8' 2 approach spans of 11 and 13 m. re- spectively, across the Grosse Weser; also a river span of 60 m. across the Kleine Weser
0.8	-	Bremen, Grosse Weser bridge	"	6.02	2 32.20 1 63.30	Navigation chart zero, El. -1.09 m. (-3.37 m. Bremen Datum)
8.4	-	-	"	-	-	Footbridge
10.2	Railroad bridge	-	"	6.00	3 68.37	-
26.5	-	Near Uesen	Steel and rein- forced con- crete	4.50	1 68.37 2 57.60	-
44.2	-	Near Ritzenberg- en	Steel	4.44	76.60	3 spans
73.0	-	Highway, Across the Lock; Upper Canal	"	5.0	60.0	*Distance is given through the lock
64.9	-	At Hoya RR Sta.	"	5.49	1 32.30	2 side spans, each 25.7 m. wide
68.0	At Hoya	-	"	5.16	1 71.60	2 side spans, 30 m. wide each
92.0	Wienburg	-	"	5.07	1 98.0	2 side spans; 7 flood spans
98.7	-	Wienburg	"	4.68	111.0	-
120.5	-	At Stolsenau	"	4.72	1 64.30	2 side spans, 30.10 m. wide each
(1)	See NOTE on Exhibit 20					

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BRIDGES

CROSSING THE

NO. 27. THE WESER, THE EMS-WESER REGION

KM FROM 0.0	NAME AND LOCATION		TYPE - MATERIAL	CLEARANCE (m)		REMARKS
	RAILROAD LINE	HIGHWAY ROUTE		VERTICAL H. B. W.	HORIZONTAL BET. CROSSING SPAN	
(1)		NO. 27b.	MITTELWESER (MIDDLE WESER)	(Cont.)		
188.9	-	Ems-Weser Canal	-	8.97	2 80.00	Arch bridge. 2 river spans, 6 flood spans
180.1	Minden, Harrow gauge	-	Steel	4.84	1 68.00	14 flood spans
180.6	-	Minden	-	4.60	1 72.80	6 flood spans
		NO. 27c.	OBERWESER (UPPER WESER)			
165.7	-	At Barkhausen, Aulhausen	Steel	5.56	88.00	Suspension bridge. 1 river span; 13 arch flood spans
175.8	Hamm-Hannover	-	"	6.85	1 79.00	1 river and 2 flood spans
180.6	-	At Vlotho	Reinforced concrete	11.96	1 60.00	1 river span and 6 flood spans
182.3	Railroad bridge	-	Steel	5.35	1 57.68	1 river and 3 flood spans
195.7	-	At Elbergen	"	4.92	1 64.00	Navigation passage under the central span; 2 side spans 30.60 m. wide each
201.1	-	Rinteln	Reinforced concrete; Steel	4.00	1 85.00	1 river span and 2 flood spans. 22.36 m. wide each
217.9	-	Bessisch-Oldendorf	Steel	5.03	79.80	Suspension bridge. 1 river and 3 flood spans
229.3	-	At Hameln	-	4.36 4.75	1 44.10	Cantilever bridge. 6 river spans. Navigation passage under the main span (44.10 m.) Downstream side Upstream side
229.9	At Hameln	-	-	8.44	2 63.00	3 river and 3 flood spans. Navigation passages, under 2 of the river spans
237.1	At Emmer	-	Steel	4.27	1 62.80	2 river and 2 flood spans. Navigation passage, under the span at the left
237.6	-	At Hagenohsen	"	4.26	1 74.50	1 river and 2 flood spans. Navigation passage, under the middle span
	(1)	See NOTE on Exhibit 22				

SECURITY INFORMATION
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Exhibit 21

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BRIDGES CROSSING THE

NO. 27. THE WESER, THE FLS-WESER REGION

KM FROM 00	NAME AND LOCATION		TYPE - MATERIAL	CLEARANCE (m)		REMARKS
	RAILROAD LINE	HIGHWAY ROUTE		VERTICAL H. B. W.	HORIZONTAL BET CROSSING SPAN	
(1)		NO. 27e.	WESER (L.P.E. WESER)	(Cont.)		
252.7	At Kammada	-	Steel	4.55	1 77.40	2 river and 10 flood spans. Navigation passage, under the river span on the right bank
253.6	-	Near Doerwerder	"	4.03	1 46.90	1 river and flood spans. Navigation passage, under the middle span
264.2	-	At Holmsinden	"	3.67	2 38.04	3 spans. Navigation passage, under 2 spans on the right
293.5	Corvey	-	"	4.56	1 120.0	1 river and 4 flood spans
296.1	-	At Hörter	"	4.33	1 44.02	6 river and 1 flood spans. Navigation passage, under the left river span
300.9	Near Fürstenberg	-	"	8.38	1 40.00	3 river and 5 flood spans. Navigation passage, under the fourth span from the right bank
305.9	Railroad bridge	-	"	5.40	1 75.00	1 river and 10 flood spans
311.4	-	Near Beverungen	"	4.86	1 62.75	1 river and 2 flood spans
320.0	-	Near Karlshafen	"	4.65	1 45.00	3 spans. Navigation passage, under the first span from the left
336.3	-	Gieselwerder	"	4.34	1 53.30	2 river spans; and 2 masonry flood spans, 15.6 m. wide each. Navigation passage, under the left bank river span
(1)						
NOTE: To convert the kilometer system of inland water route, (measured upstream from Kaiserbrueck at Bremen to Hann-Muenden), to official stationing of Weser River, (measured downstream from Hann-Muenden to Gross Weser-Brueck at Bremen), subtract inland water route kilometers shown in column 1 from:						
367.4 (between Bremen & highway bridge at Doerwerden Lock)						
363.8 (between highway bridge at Hoya R. R. station & R. R. Bridge near Vlotho)						
364.4 (between highway bridge at Elsbergen & Hann-Muenden)						

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Exhibit 22

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SECURITY INFORMATION
BRIDGES
CROSSING THE

No. 38. THE FULDA, THE HES-SIEGER REGION

KM FROM 00	NAME AND LOCATION		TYPE - MATERIAL	CLEARANCE (m)		REMARKS
	RAILROAD LINE	HIGHWAY ROUTE		VERTICAL H. S. W.	HORIZONTAL OBT. CROSSING SPAN	
0.2	-	-	-	4.50	1 69.80	Suspension bridge
0.8	-	Highway	Steel	6.75	1 20.00	Arch bridge. 7 spans: 1-27.50 m.; 2-23.75 m., 2-26.25 m.; 2-20.00 m. wide. The navigable span is the seventh on the right
16.6	Railroad viaduct	-	-	20.15	• 21.00	Arch viaduct. 4 river and 1 flood span. Navigation passage about 16 m. wide width at the spring- line height of arch
27.1	-	Kassel (Cassel) Harbor Bridge	Steel	6.00	rd 60.0	-
27.8	-	At Kassel	Reinforced concrete	about 4.0	57.5	Arch bridge clearance under arch
28.4	-	-	-	4.0	70.0	Footbridge
31.4	Railroad bridge	-	Steel	5.40	24.00	-
38.2	-	Dennhausen	Concrete	5.00	1 28.00	Arch bridge
39.7	-	Dittmarshausen	Concrete	5.00	1 30.00	-
43.0	-	Restaurant	•	3.60	1 26.00	Arch bridge; 3 river and 1 flood span
43.3	Railroad bridge	-	-	20.50	1 11.60	Arch bridge
47.1	At Duxhagen	-	-	6.30	1 20.00	" "
53.1	-	At Grebenau	Concrete	3.50	1 15.00	" "
55.4	-	At Warenfurth	Masonry	3.50	1 14.00	" "
60.8	-	At Röhrenfurth	Steel	4.05	1 15.00	-
64.4	-	At Melsungen	-	4.70	1 12.40	Arch bridge
64.5	-	Near Melsungen	Steel	3.20	1 20.35	Footbridge
66.5	-	At Chermel- sungen	Concrete gir- der	3.50	25.20	-
66.7	Near Melsungen	-	-	7.77	1 12.50	Arch bridge
69.1	Near Malsfeld	-	Steel	1.00	1 27.00	-
72.6	Near Beiseforth	-	•	7.17	1 12.50	-
73.4	-	At Beiseforth	-	3.30	1 15.00	Arch bridge
76.3	-	At Beiseforth	Concrete	6.00	1 36.00	" "
79.3	-	At Neuenroth	Steel	6.45	1 17.30	-

SECURITY INFORMATION

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Exn. 611 23

MAJOR BRIDGES

ELDER RIVER
(Downstream from Elder Dam)

Km. from Elder Dam	Name & Location	Type	Material	Remarks
2.0	Hemfurth	Road	Steel Girder	5 span
2.1	Hemfurth	Railroad		5 span, single truck
6.5	Affoldern	Road	Concrete	3 span
7.0	Mehlen (Affoldern)	Road		
9.0	Bergheim	Railroad		Single track
10.0	Bergheim	Road		
12.0	Anraff	Road	Steel Girder	6 span, sheet piling piers
14.0	Wega	Road		5 span, sheet piling piers
16.0	Mandern	Road		2 span

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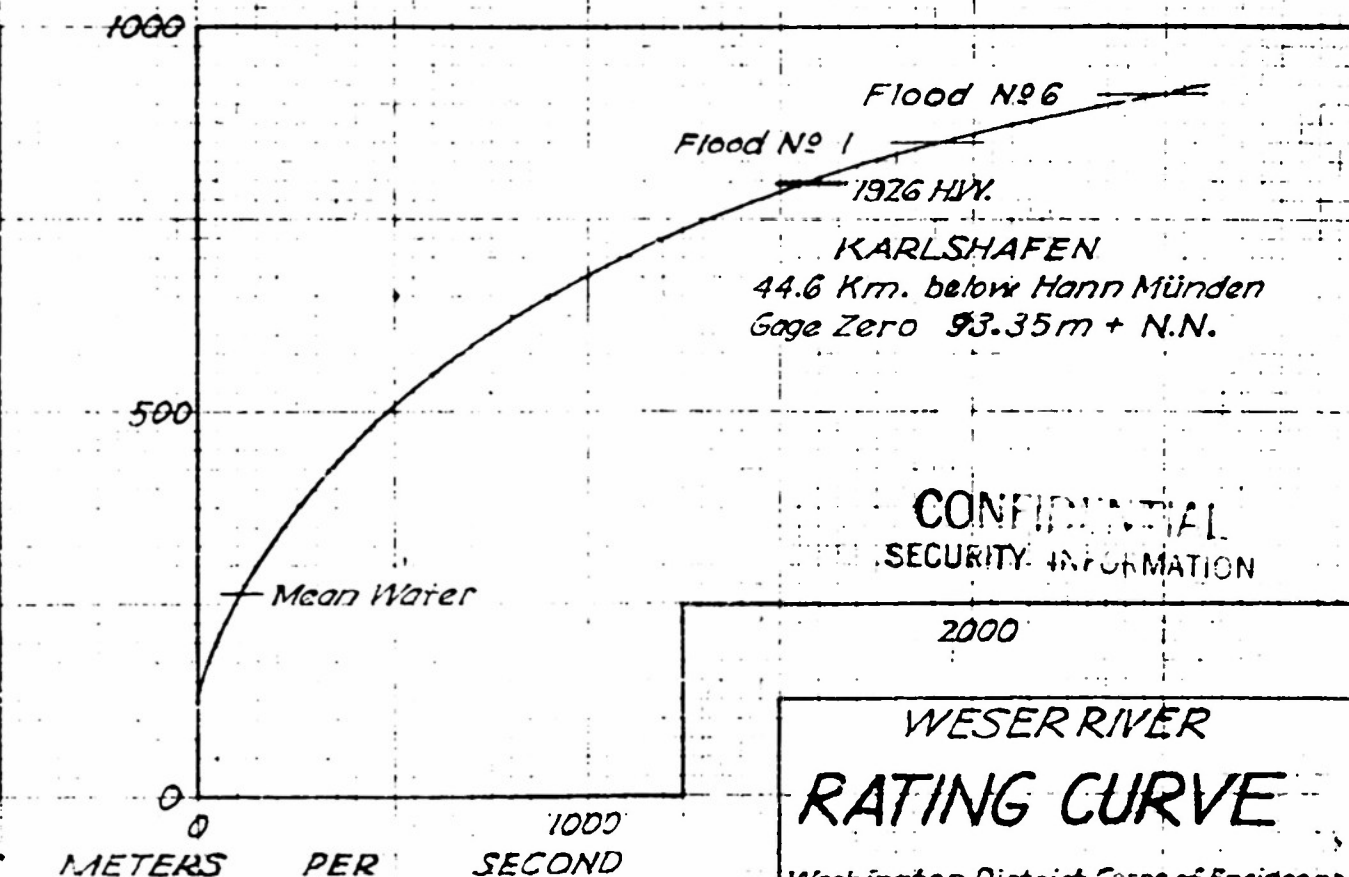
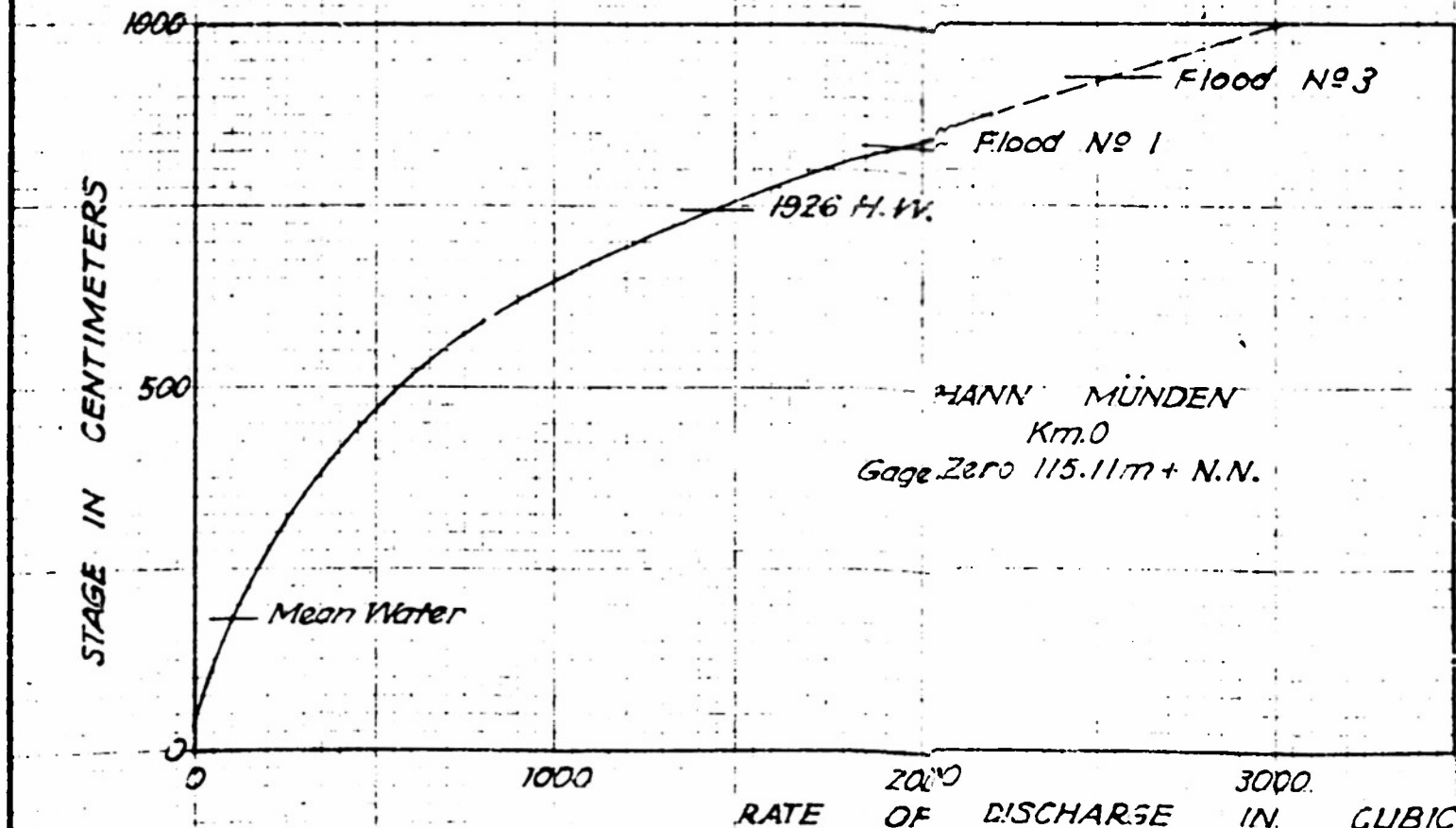
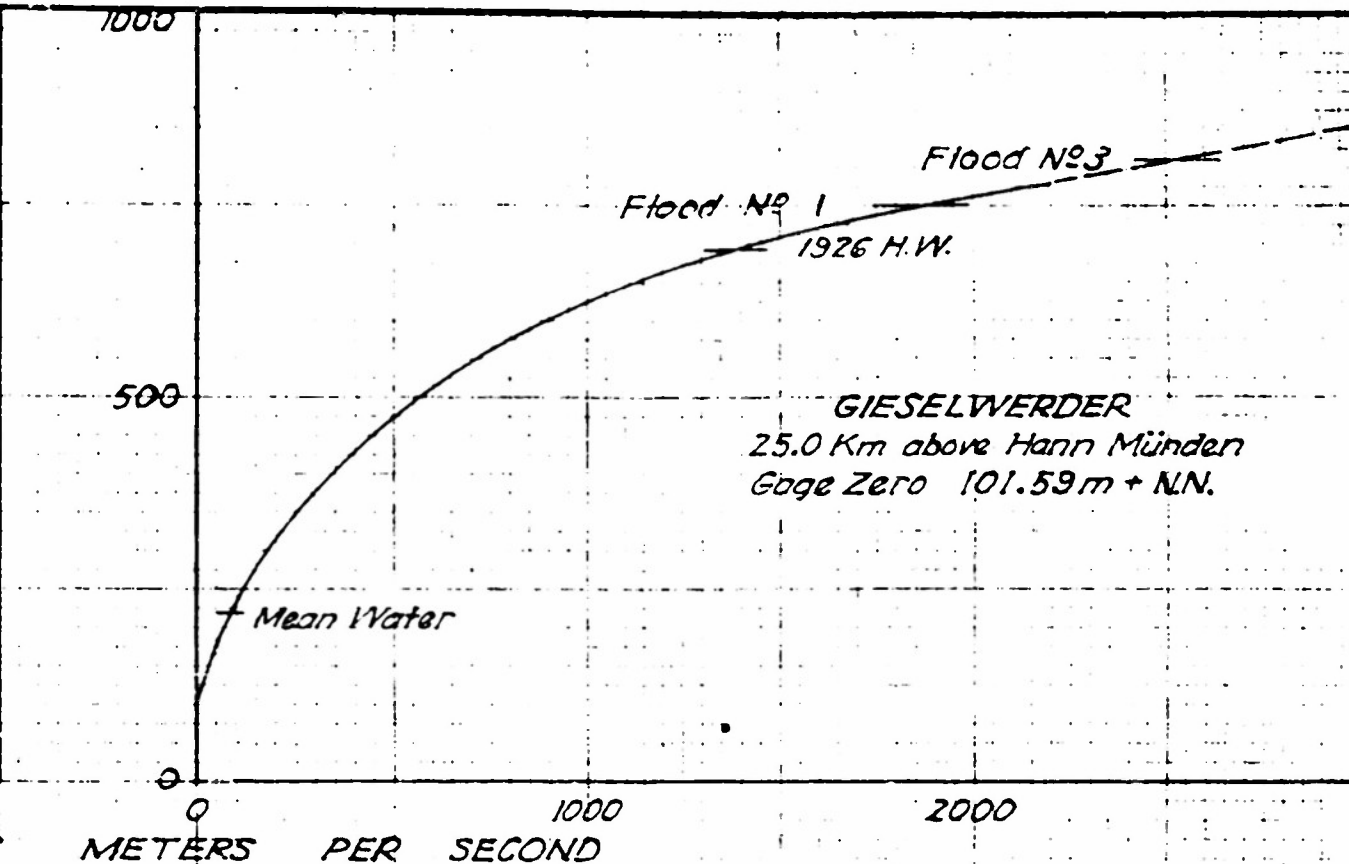
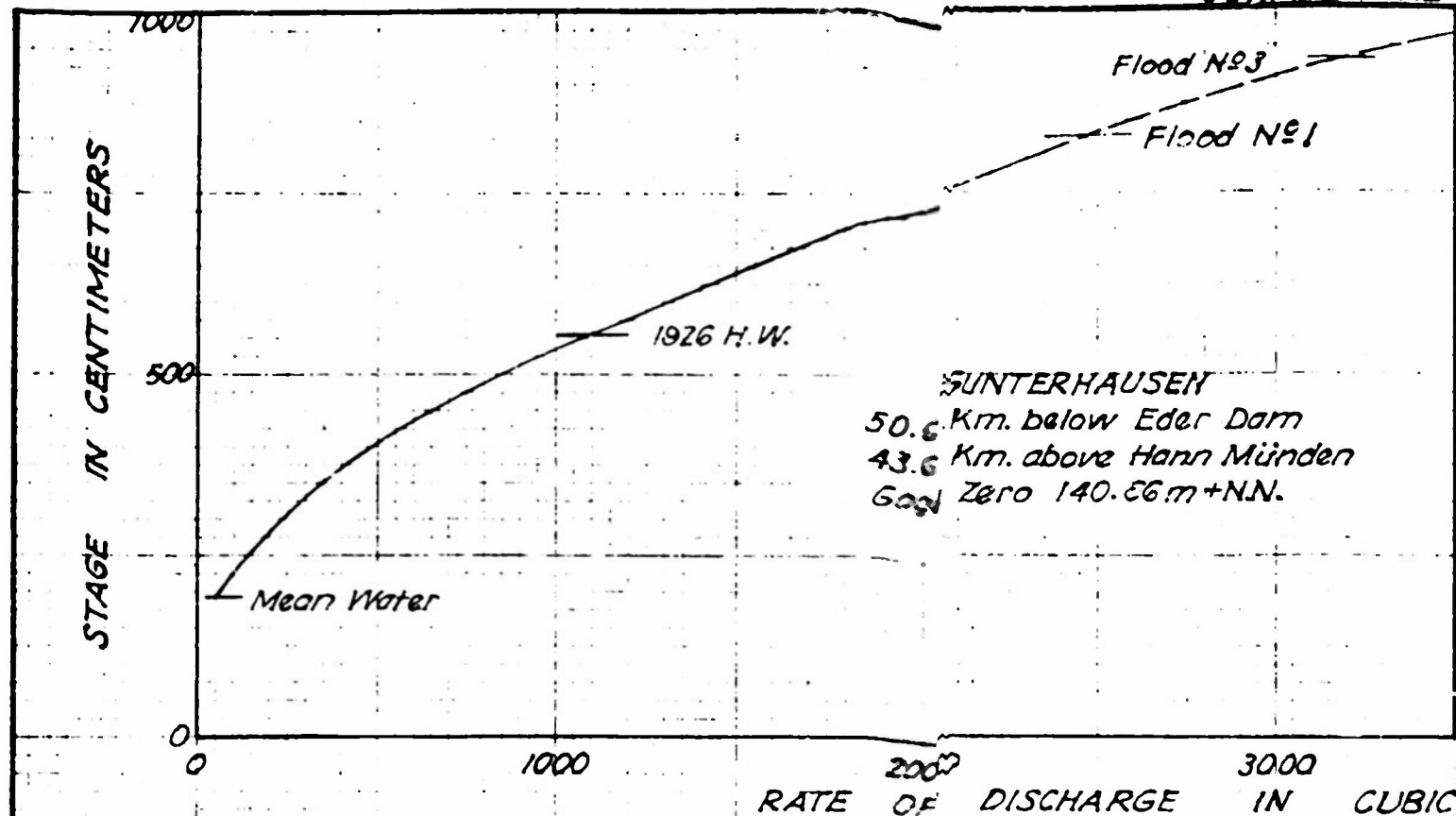
SECRET

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30.0	Wrexen	Road	(Side) Reinf. concrete beam and slab	3 span, remain. old
34.0	Rimbeck	Road	Steel Truss	Single span, masonry abutments
			(Main) Steel girder	4 span, masonry piers
			(Side) Steel girder	2 span, masonry piers
37.2	Ossendorf	Road	Iron	2 span
39.4	Gernate	Road	Concrete Arch	7 span, concrete piers
43.2	Warburg	Road	Concrete	3 span
44.0	Warburg	Railroad	Steel & Masonry Arch	Multispan, masonry pier
44.5	Warburg	Road	(Rt) Masonry Arch	6 span
			(Lt) Masonry Arch	3 span
47.5	Dalheim	Road	Timber	3 span
50.0	W. of Heneda	Railroad	Masonry Arch	6 span, single track
59.5	Lamerden	Road	Steel Truss	2 span
63.5	Eberachbuts	Road	Steel girder	3 span
65.3	Sielen	Road	Masonry Arch	3 span, masonry piers
69.8	Trendelburg	Road	Masonry Arch	3 span, masonry piers
77.5	NE of Deisel	Road	Masonry Arch	Single span
82.2	Heilmannshausen	Road	Masonry Arch	3 span, masonry piers
85.0	Heilmannshausen	Road	Masonry Arch	2 span, masonry piers

Exhibit 25

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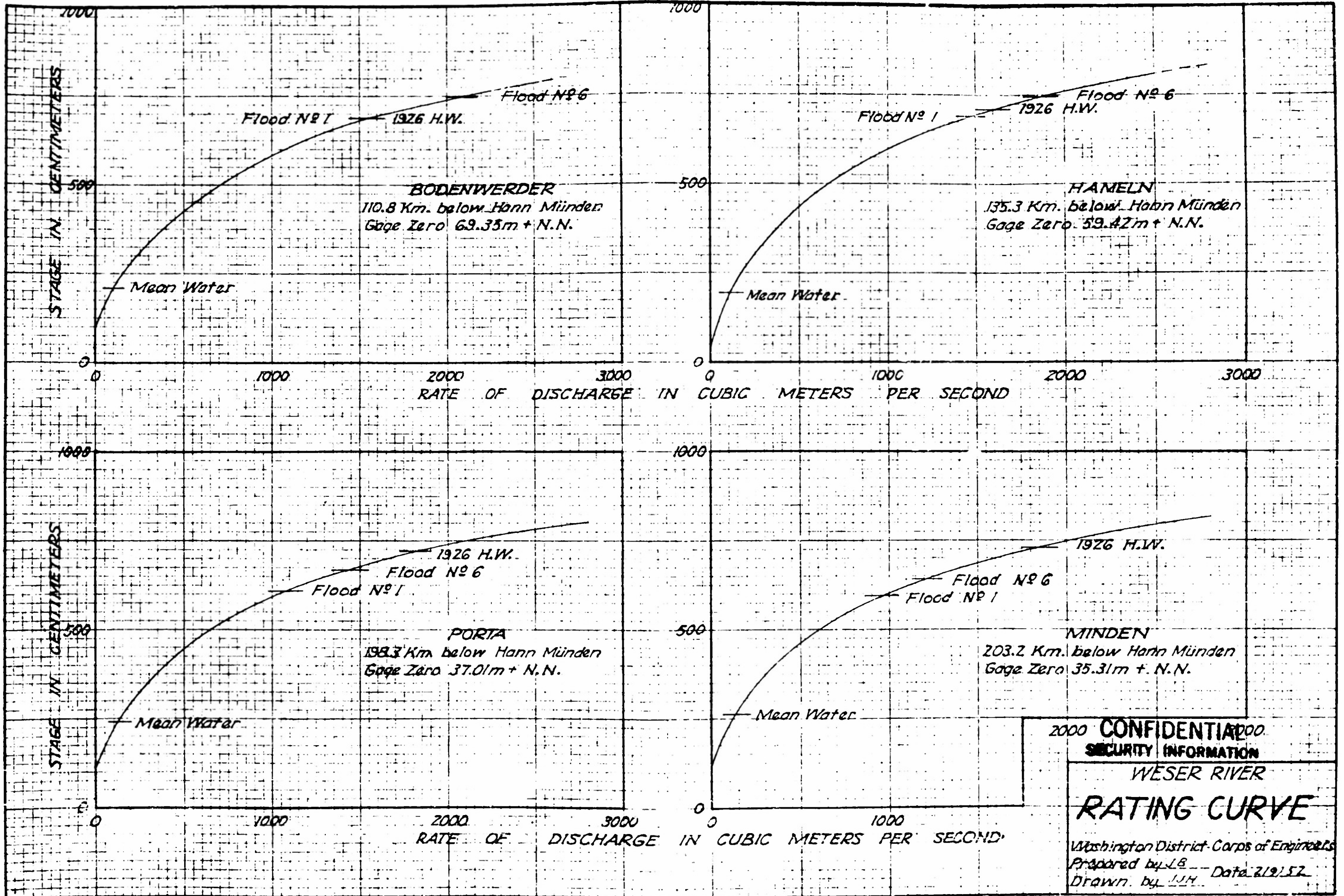
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WESER RIVER RATING CURVE

Washington District Corps of Engineers
 Prepared by H.E. Date 2/10/51
 Drawn by L.M.

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WESER RIVER

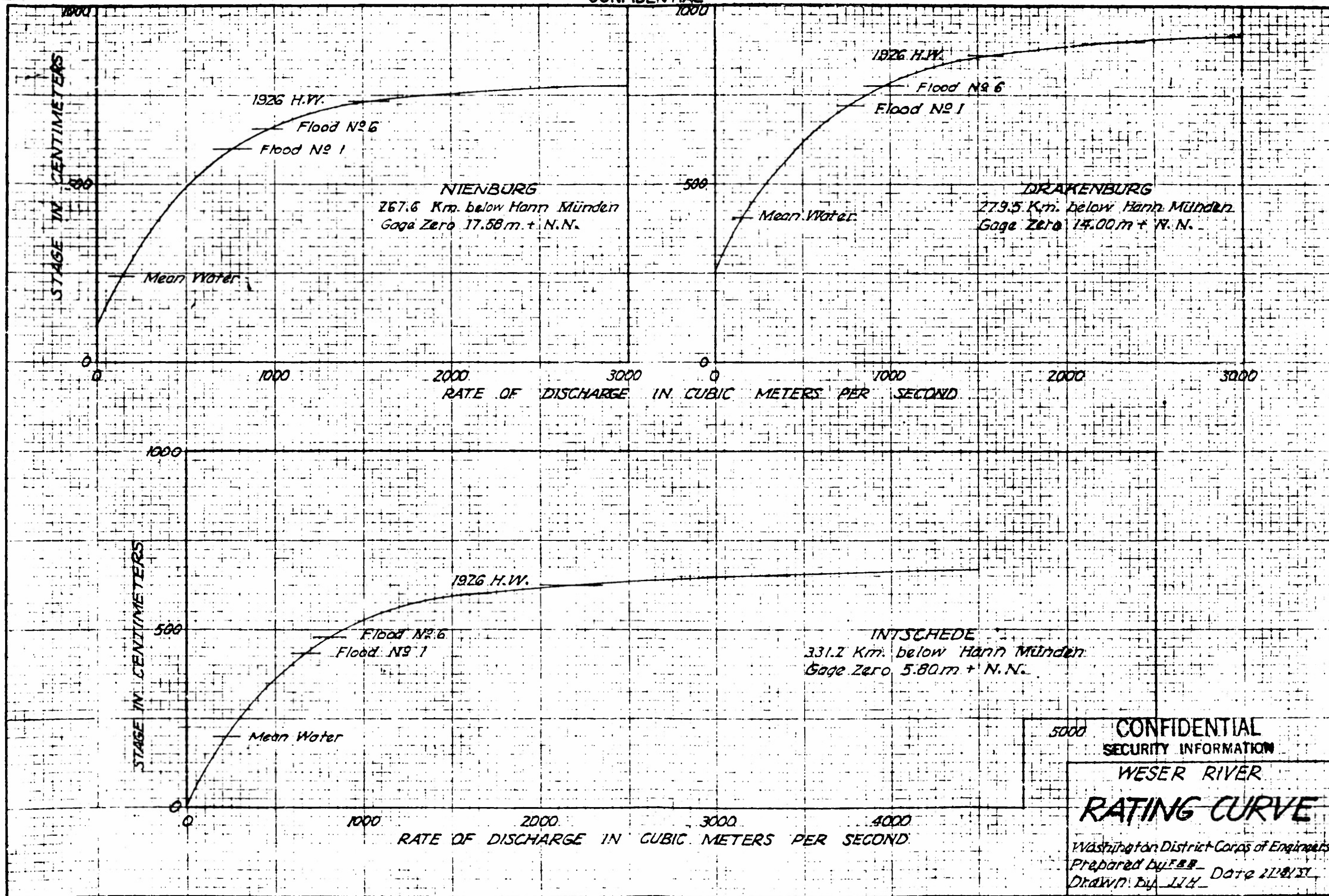
RATING CURVE

Washington District Corps of Engineers
Prepared by J.B. -- Date 2/9/52
Drawn by J.H.

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Exhibit 27

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 SECURITY INFORMATION
 WESER RIVER
RATING CURVE
 Washington District Corps of Engineers
 Prepared by F.B.B. Date 11/8/31
 Drawn by J.H.

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SUMMARY OF GAGE DATA
WESEER RIVER

Gaging Station (Regel)	Km from Eder Dam	Km from Hahn- Muerden	Drainage Area Sq. Km.	Gage Zero m/ N.M.	Item *	Date or Period of Record	River Stage in Centimeters above Gage Zero												Winter	Summer	Year
							Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.			
Hamein (Werderspitze)	230.0	135.6	17,113	59.42	HHW	3 Jan 1926			714												714
					HW	1926-1935													714	498	714
					MHW	"	326	316	393	325	315	311	296	226	230	185	170	236	479	305	494
					MW	"	206	204	264	235	225	230	185	163	164	151	145	158	227	161	194
					MNW	"	147	132	176	171	172	164	151	129	121	120	125	119	117	107	103
					NW	"													81	69	69
Forte	292.3	198.4	19,184	37.01	NNW	30 Nov 1921	22														22
					HHW	3 Jan 1926			729												729
					HW	1926-1935													729	505	729
					MHW	"	357	359	426	363	349	339	276	257	264	221	204	271	504	337	518
					MW	"	244	249	305	283	267	267	224	201	200	188	183	195	269	198	233
					MNW	"	196	188	221	221	223	210	195	176	170	167	172	167	174	160	157
Drakenburg	373.9	279.5	22,036	14.00	NW	"													144	123	123
					NNW	1 Dec 1921		115													115
					HHW	4 Jan 1926			857												857
					HW	1926-1935													857	676	857
					MHW	"	528	524	597	552	530	518	446	417	424	374	357	424	695	507	702
					MW	"	412	424	487	462	439	439	387	360	356	342	334	350	444	355	400
Intschede	425.6	331.2	37,906	5.80	MNW	"	355	350	397	397	390	375	355	330	320	316	320	315	343	306	306
					HW	"													291	241	241
					NNW	2 Oct 1934												241			241
					HHW	29 Feb 1940				662											662
					HW	1926-1935			630										630	470	630
					MHW	"	330	357	431	370	366	341	256	215	214	165	142	210	504	319	515
					MW	"	214	233	316	285	255	253	184	147	143	121	112	133	259	140	199
					MNW	"	146	151	201	209	190	168	141	108	91	87	93	90	130	74	74
					NW	"												4	56	4	4
					NNW	1 Oct 1934												4			4

*See Exhibit 1 for definition of terms

Exhibit 30

SUMMARY OF TIDAL GAGE DATA
WESER RIVER

Gaging Station (Fegel)	Km from Muerden	Km from Bremen	Gage Zero m + M.	Tide	Item	Date or Period of Record	River Stage in Centimeters above Gage Zero or 0														Year
							Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Winter	Summer	
Bremen (Luederitzbrücke)	366.8	0	-5.00	Flood	HHThw	23 Nov 1930	949														949
					HThw	1931-1935													949	850	949
					MHThw	"	810	764	816	820	766	779	763	773	787	768	804	814	874	823	874
					MThw	"	710	697	719	721	702	714	710	714	722	709	711	717	710	714	712
					MNThw	"	612	579	650	625	625	641	640	647	675	654	641	633	558	614	558
					LThw	"													538	583	538
					NNThw	25 Jan 1937			490												490
				Ebb	HHTnw	10 Jan 1932			716												716
					HTnw	1931-1935													716	607	716
					MHTnw	"	506	500	556	525	486	502	447	456	464	433	470	500	611	536	624
					MThw	"	419	405	453	444	408	421	394	386	396	363	391	402	425	392	408
					MNTnw	"	342	337	377	362	349	364	361	353	356	346	357	346	318	340	318
					NTnw	"													288	320	288
					NNTnw	18 Dec 1938		255													255
Vegesack	17.5	-5.00	Flood	HHThw	23 Nov 1930	922															922
				HThw	1931-1935														922	834	922
				MHThw	"		790	738	791	807	744	760	743	752	767	747	785	798	850	807	850
				MThw	"		689	675	691	695	678	691	689	691	702	689	691	698	686	693	690
				MNThw	"		597	560	626	597	604	616	623	628	656	637	626	617	539	599	539
				LThw	"														521	566	521
				NNThw	25 Jan 1937				448												448
				Ebb	HHTnw	24 Nov 1930	639														639
					HTnw	1931-1935													639	610	639
					MHTnw	"	493	467	521	507	450	473	431	437	455	438	473	535	566	537	521
					MThw	"	403	390	411	407	382	374	383	385	396	389	396	406	380	383	385
					MNTnw	"	324	320	363	327	322	346	350	353	361	358	361	352	295	346	295
					NTnw	"													250	335	259
					NNTnw	25 Jan 1937			215												215

*See Exhibit 1 for definition of terms

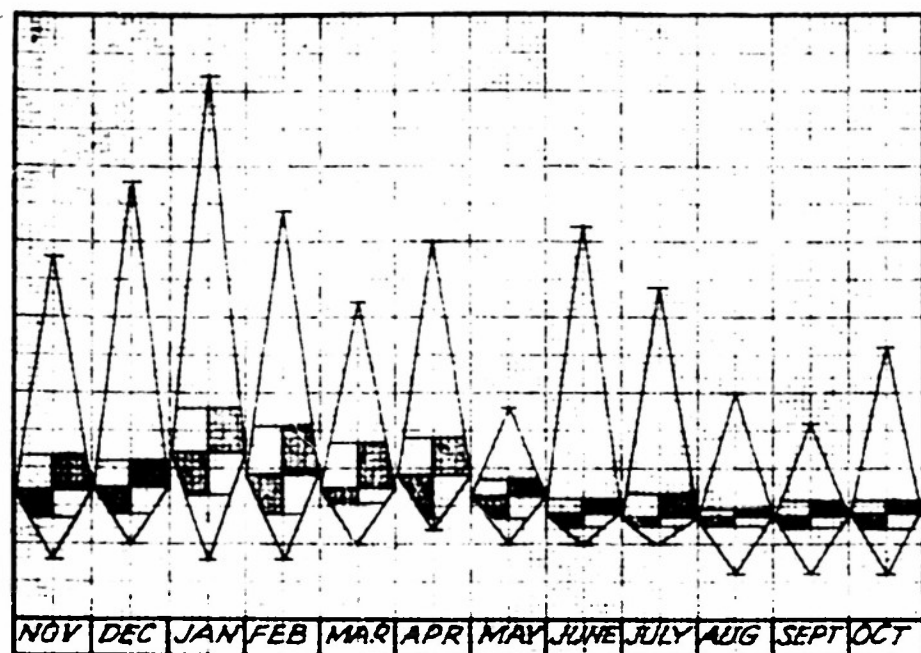
Exhibit 31

SUMMARY OF TIDAL GAGE DATA
WESER RIVER

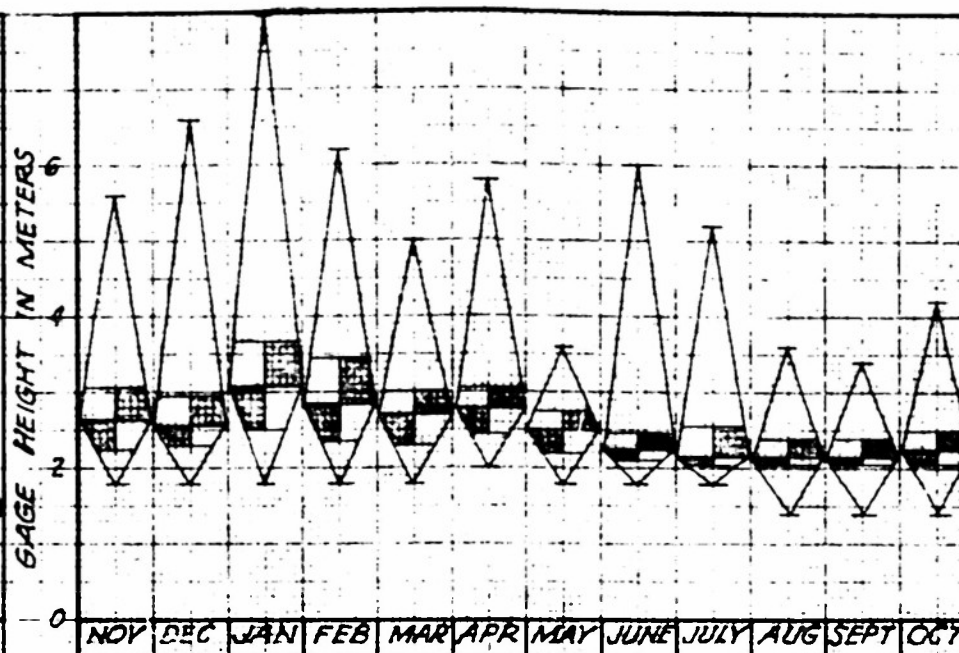
Gaging Station (Pagel)	Km From Hann- Münden	Km From Bremen	Gage Zero m ± NN	Tide	Item *	Date or Period of Record	River Stage in Centimeters above Gage Zero													Year		
							Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Winter		Summer	
Brake	40.6	-5.00	Flood		HHThw	1 Jan 1855			987												987	
					HThw	1926-1935													919	919	919	
					MHThw	"	775	765	779	752	722	740	721	733	746	741	764	801	842	810	851	
					MThw	"	668	661	669	659	659	668	669	674	681	674	672	680	664	675	670	
					MNTlw	"	569	548	582	553	578	588	608	614	631	620	607	598	508	585	508	
					NThw	"													442	547	442	
					NNThw	16 Jan 1905			375												375	
				Ebb	HHTnw	23 Dec 1894		793														793
					HTnw	1926-1935													611	688	688	
					MHTnw	"	483	461	477	457	432	434	402	404	409	430	448	524	560	536	580	
					MTnw	"	359	354	361	347	341	346	340	343	349	349	354	366	351	350	351	
					MNTnw	"	272	276	295	269	281	285	308	306	307	304	308	300	238	290	237	
					NTnw	"													188	265	188	
					NNTnw	25 Jan 1937			135												135	
Wesermünde (Doppelschleuse)	65.3	-5.00	Flood		HHThw	3-4 Feb 1825				1004										1004		
					HThw	1926-1935													938	938	938	
					MHThw	"	779	766	770	762	727	735	716	734	744	738	767	807	852	819	863	
					MThw	"	657	649	656	649	647	655	657	662	670	664	663	671	652	665	658	
					MNTlw	"	555	532	563	537	565	573	594	598	616	606	593	583	499	569	499	
					NThw	"													428	533	428	
					NNThw	16 Jan 1905			350												358	
				Ebb	HHTnw	23 Dec 1894		797														797
					HTnw	1926-1935													628	703	703	
					MHTnw	"	486	445	467	451	422	425	388	399	405	431	447	531	565	549	593	
					MTnw	"	335	329	330	317	312	315	313	321	329	330	337	350	323	330	327	
					MNTnw	"	234	240	243	227	241	243	270	274	281	274	276	266	197	252	196	
					NTLw	"													153	195	153	
					NNTnw	25 Jan 1937			89												89	

*See Exhibit 1 for definition of terms

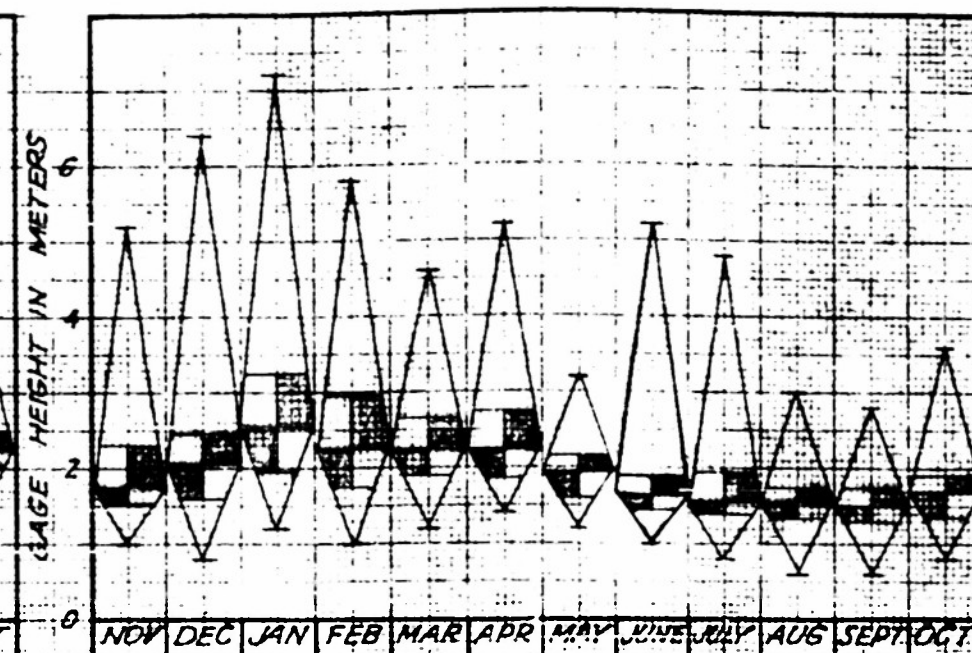
Exhibit 32



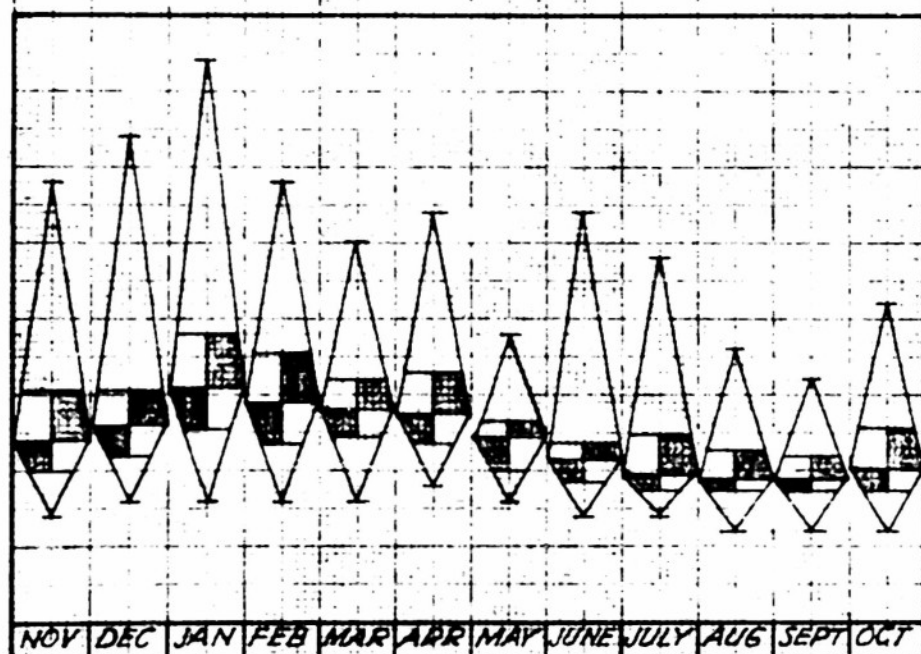
HANN. MÜNDEN (Km. 0)
GAGE ZERO 115.11m + N.N.



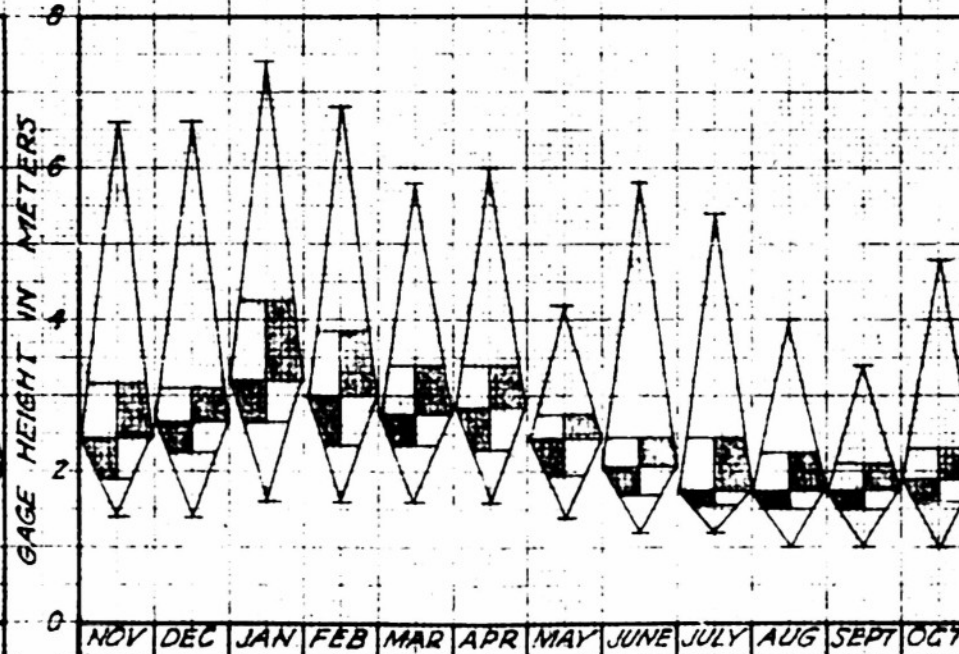
KARLSHAFFEN (Km. 44.6)
GAGE ZERO 93.35m + N.N.



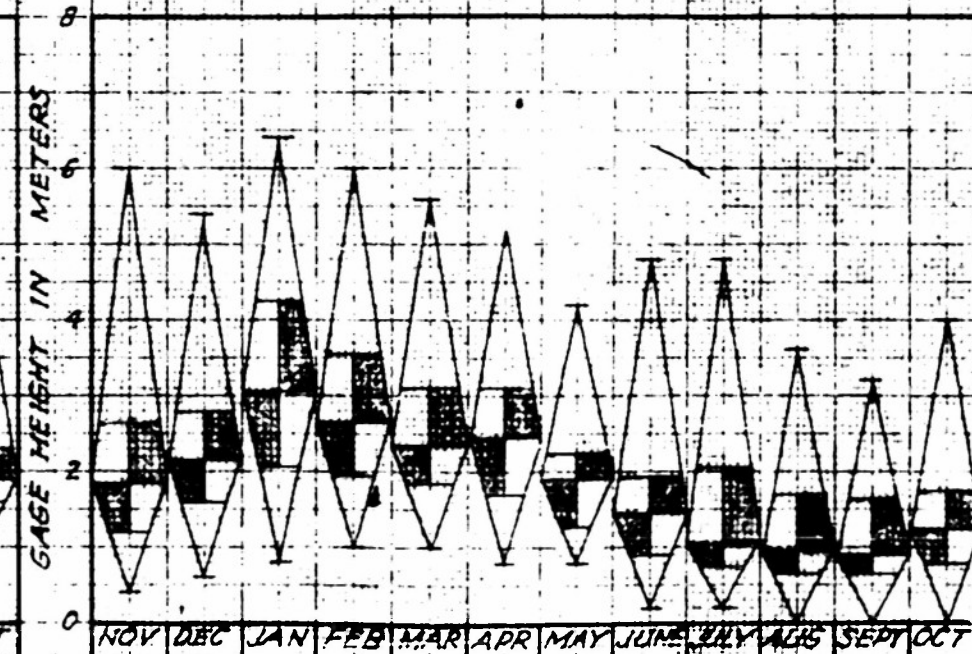
HAMELN D/S (Km. 135.6)
GAGE ZERO 59.42m + N.N.



MINDEN (Km. 203.2)
GAGE ZERO 35.31m + N.N.

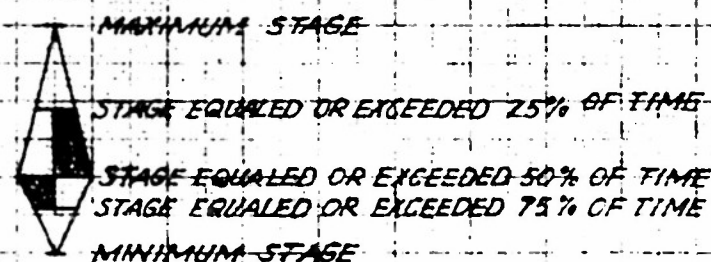


NIENBURG (Km. 267.7)
GAGE ZERO 17.47m + N.N.



INTSCHEDE (Km. 331.2)
GAGE ZERO 5.80m + N.N.

LEGEND:



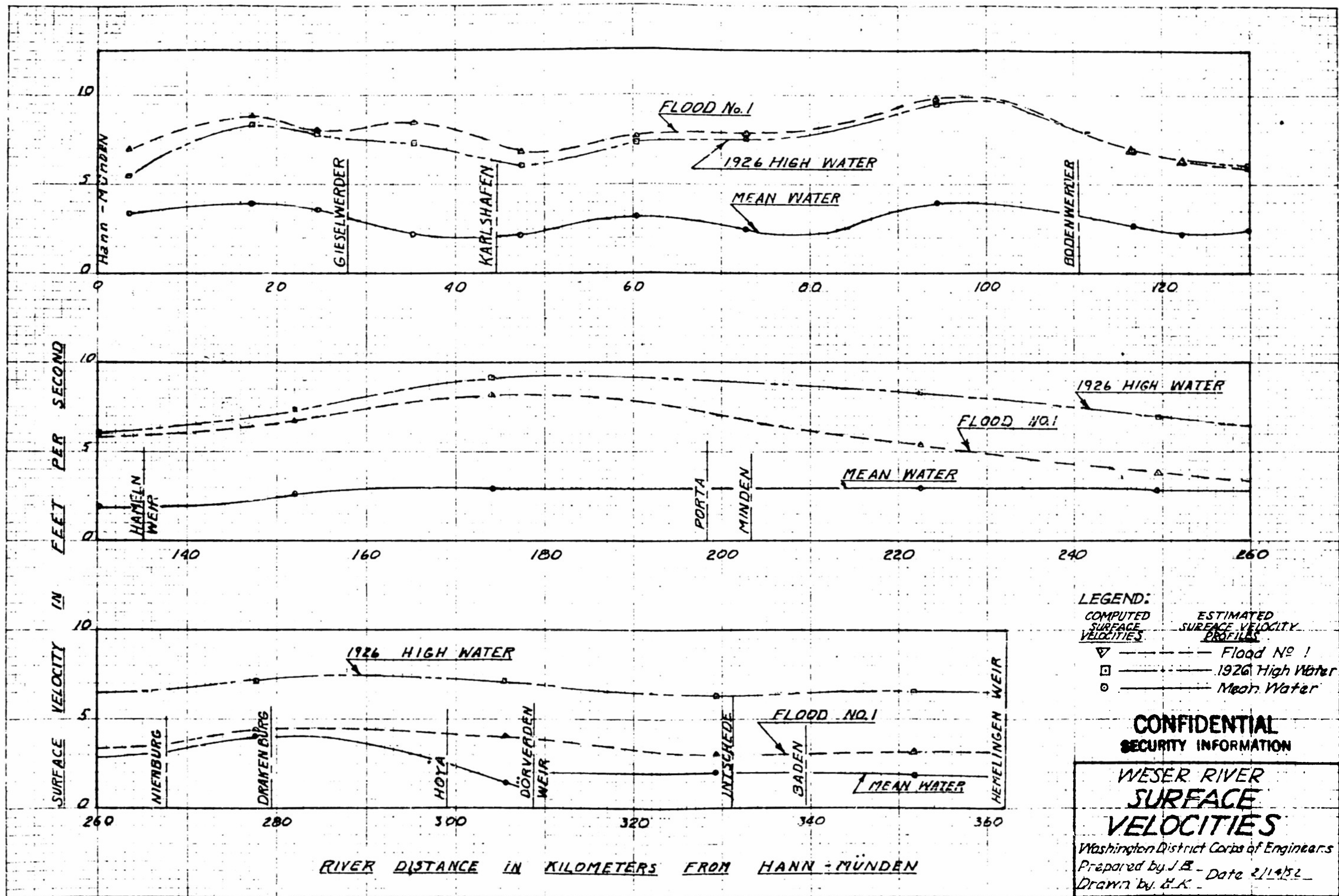
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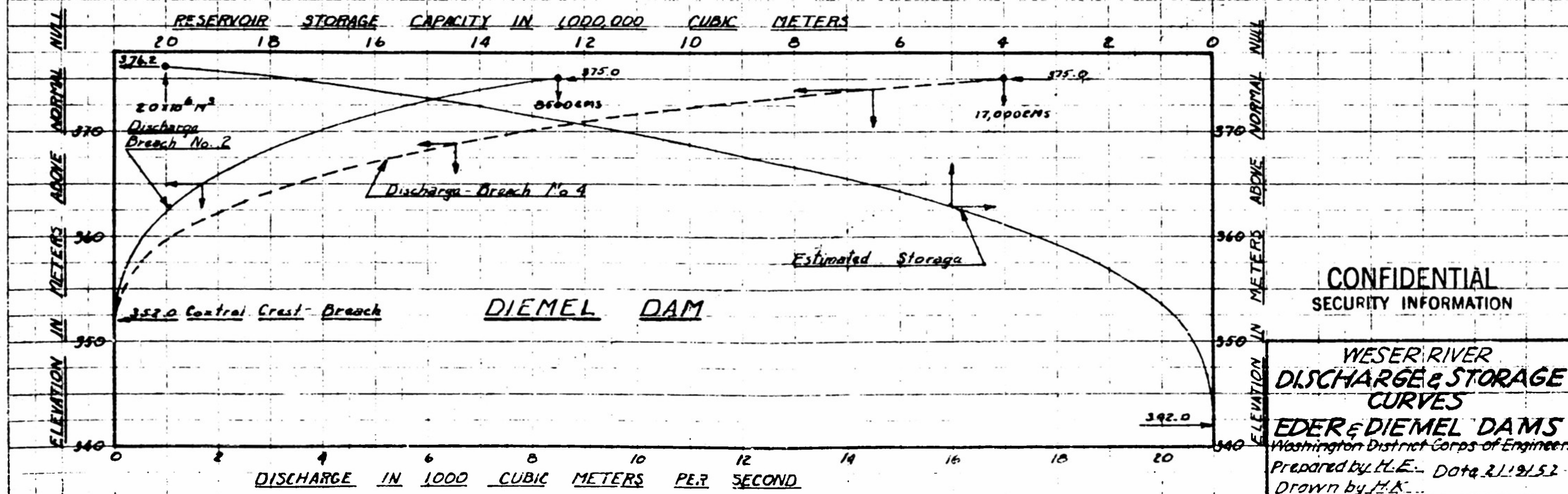
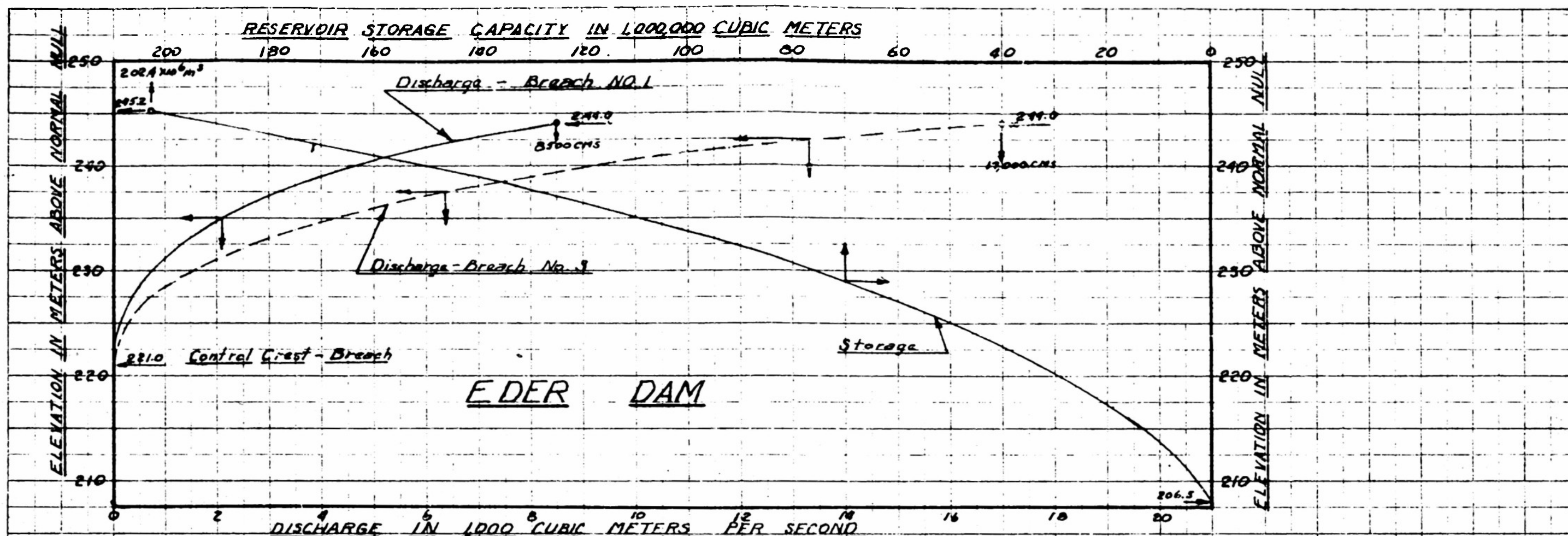
1. DURATION DATA BASED UPON DAILY OCCURRENCES WITHIN 20 CENTIMETER INTERVALS EXPRESSED AS PERCENTAGE OF TOTAL OCCURRENCES IN A GIVEN MONTH OVER THE 10 YEAR PERIOD FROM 1 NOVEMBER 1926 TO 30 OCTOBER 1935.
2. SOURCE OF DATA: "REPORT ON WESER SYSTEM," C.E. HQ. B.A.O.R., 1946.

**RESTRICTED
SECURITY INFORMATION**

**WESER RIVER
STAGE
DURATION**

Washington District Corps of Engineers
Prepared by E.B.F. Date 31/1/52
Drawn by J.H.





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~~SECURITY INFORMATION~~

WESER RIVER DISCHARGE & STORAGE CURVES

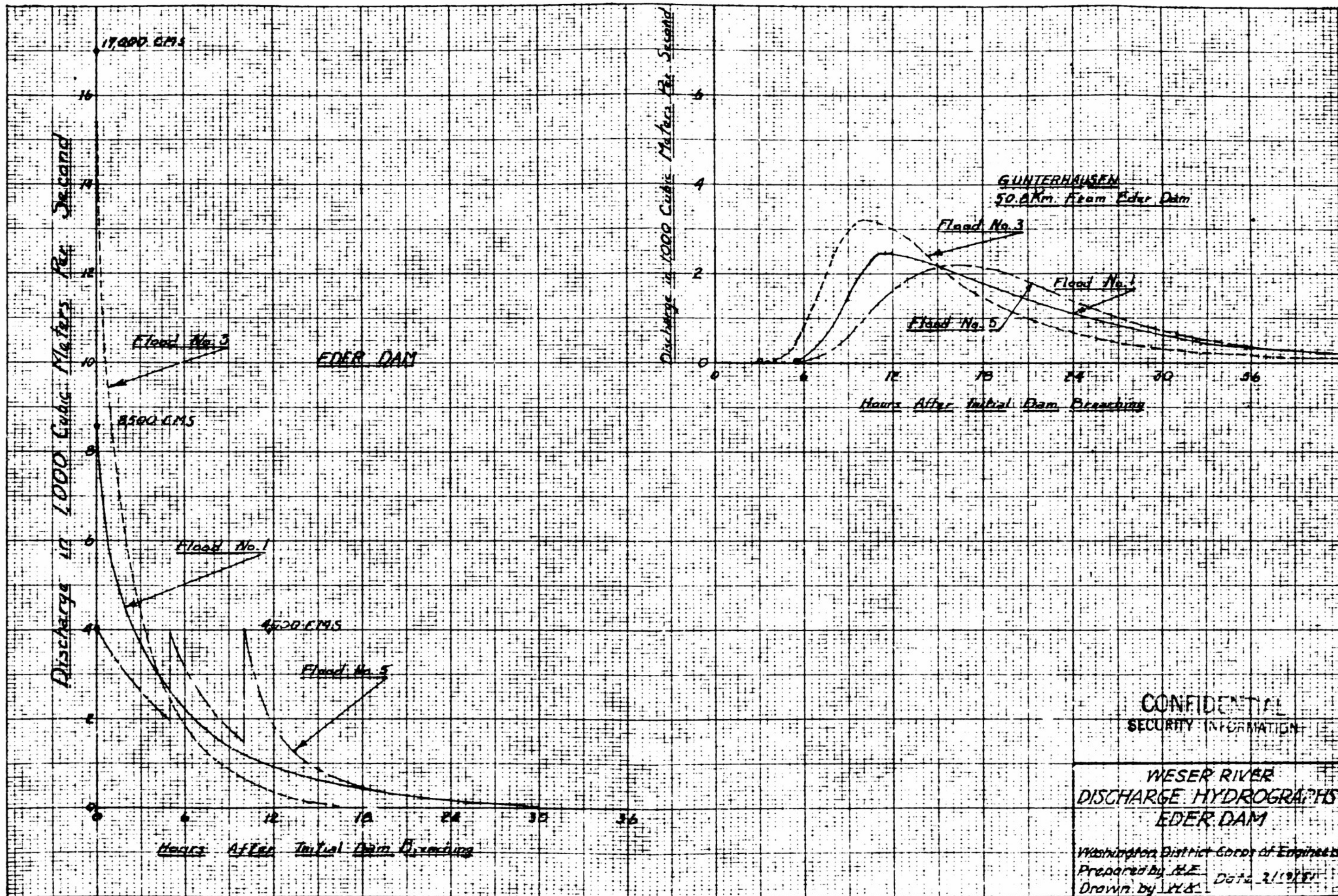
EDER & DIEMEL DAMS

Washington District Corps of Engineers

Prepared by H.E. Date 2/19/52.

Drawn by H.A.

Exhibit 35



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SECURITY INFORMATION

WESER RIVER
DISCHARGE HYDROGRAPHS
EDER DAM

Washington District Corps of Engineers
Prepared by H.E. Date 2/19/51
Drawn by H.E.

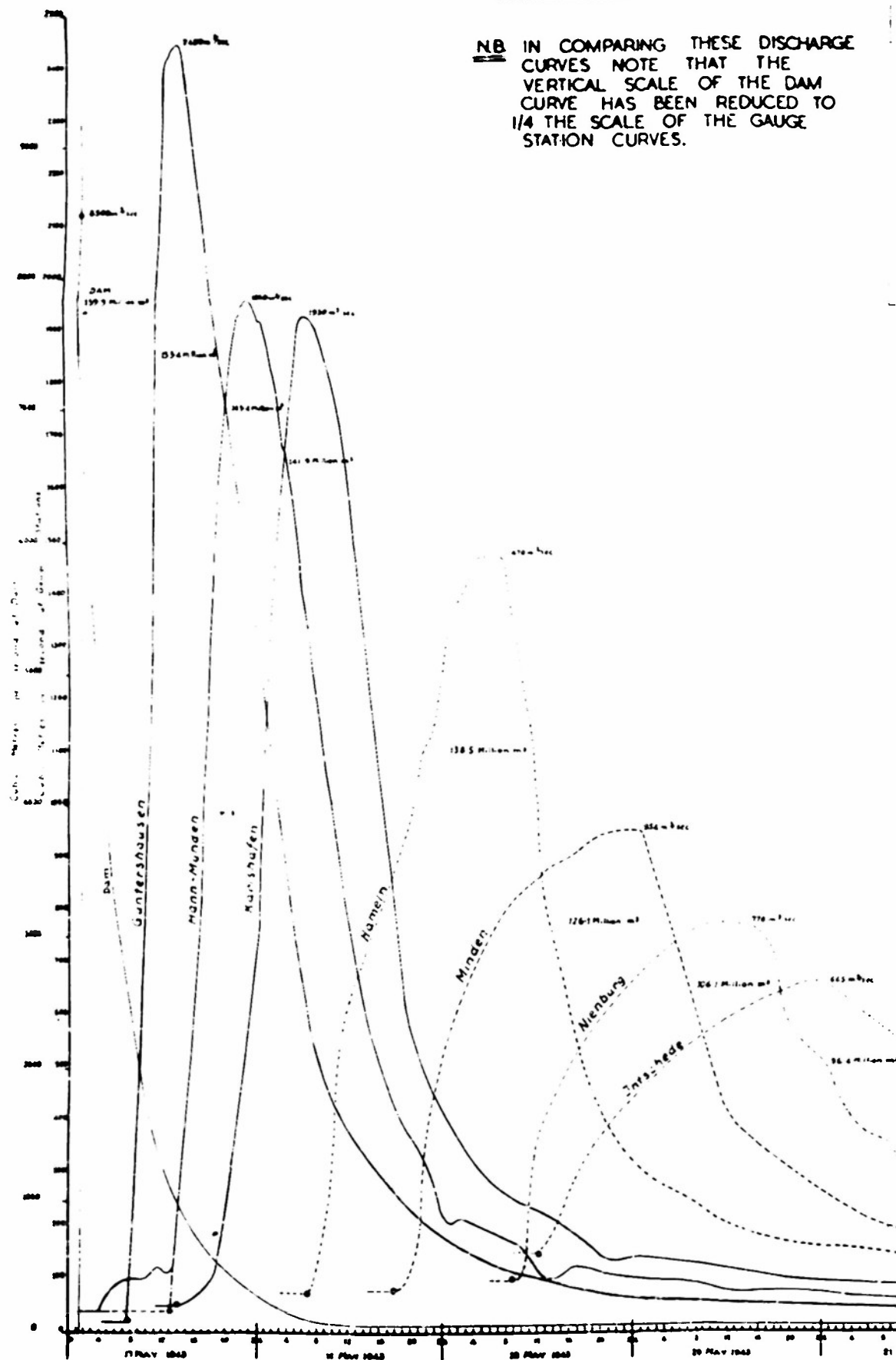
EDER DAM BREACH DISCHARGE HYDROGRAPHS

N.B. IN COMPARING THESE DISCHARGE CURVES NOTE THAT THE VERTICAL SCALE OF THE DAM CURVE HAS BEEN REDUCED TO 1/4 THE SCALE OF THE GAUGE STATION CURVES.

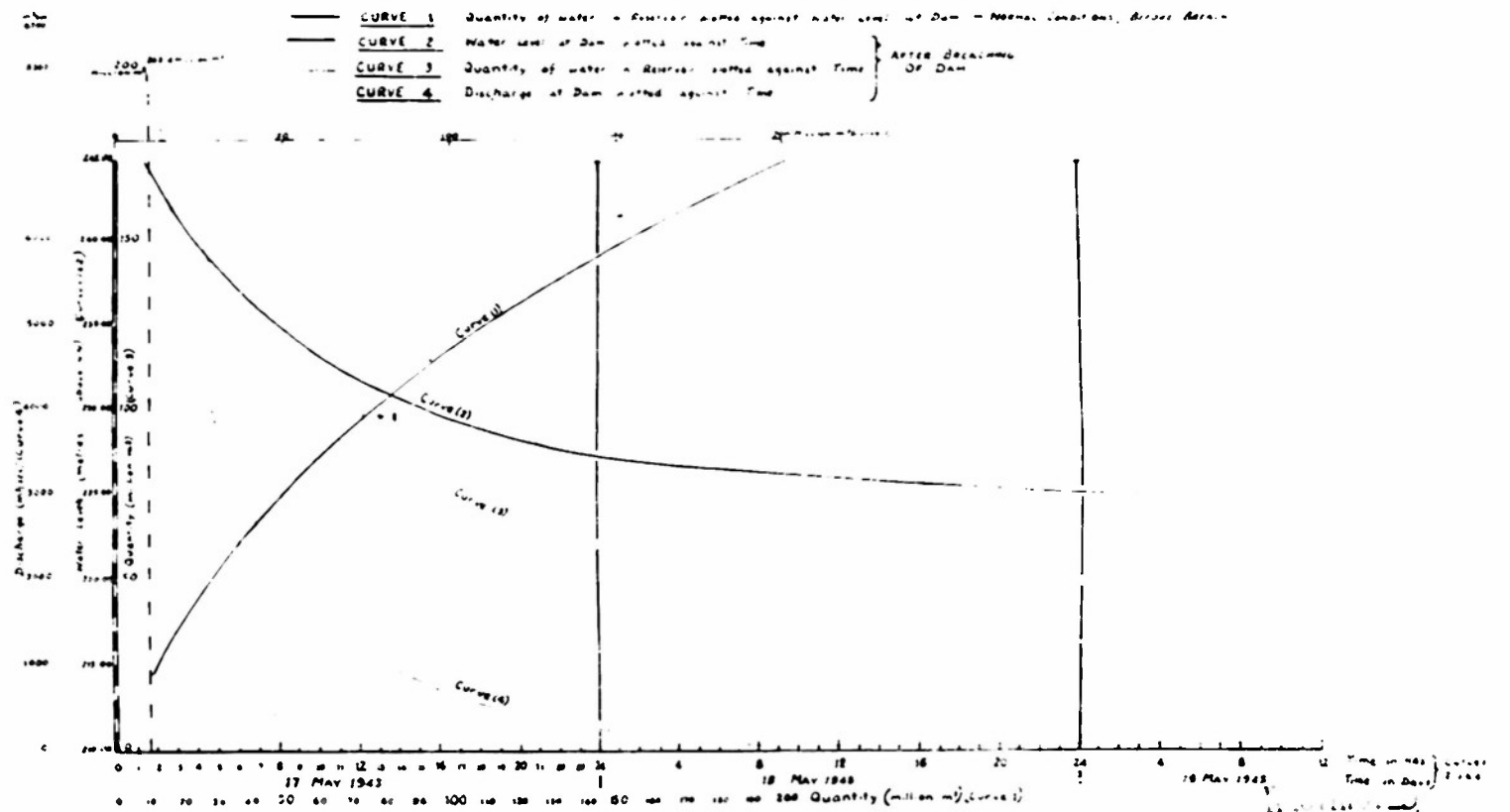
—LEGEND—

O = Beginning & End
of Waves.

————— Guntershausen
 ————— Hann. Münden
 ————— Karlshafen
 ----- Hameln
 ----- Minden
 ----- Nienburg
 ----- Intschede
 ————— Dam



QUANTITY, WATER LEVEL & DISCHARGE CURVES.

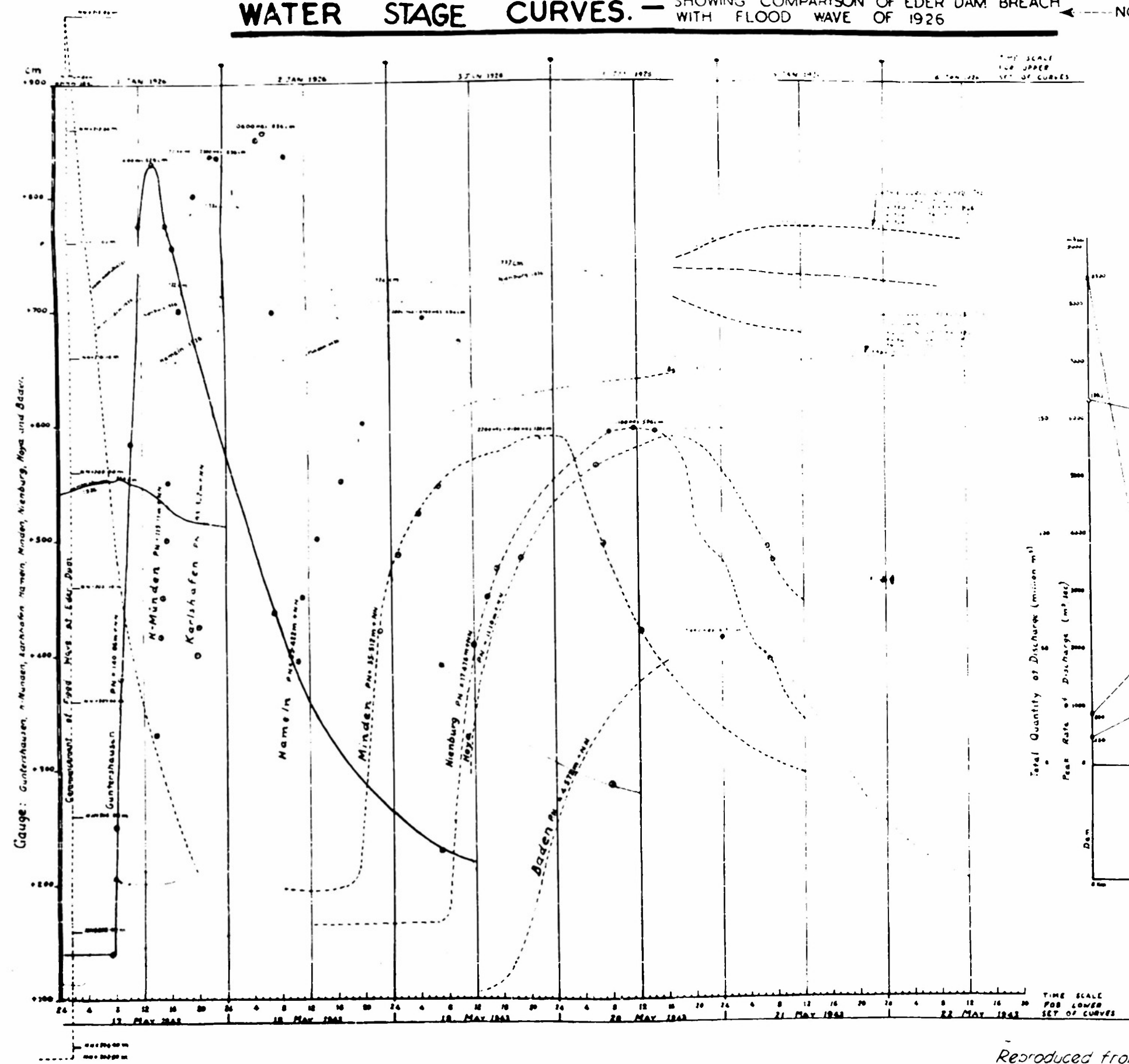


SECURITY INFORMATION
 Reproduced from "Security Matter"
 Systematic Case No. 194-22 346.

WESER RIVER DISCHARGE HYDROGRAPHS

Washington District Corps of Engineers
 Prepared by JH Date Feb 1952
 JH

WATER STAGE CURVES. — SHOWING COMPARISON OF EDER DAM BREACH WITH FLOOD WAVE OF 1926

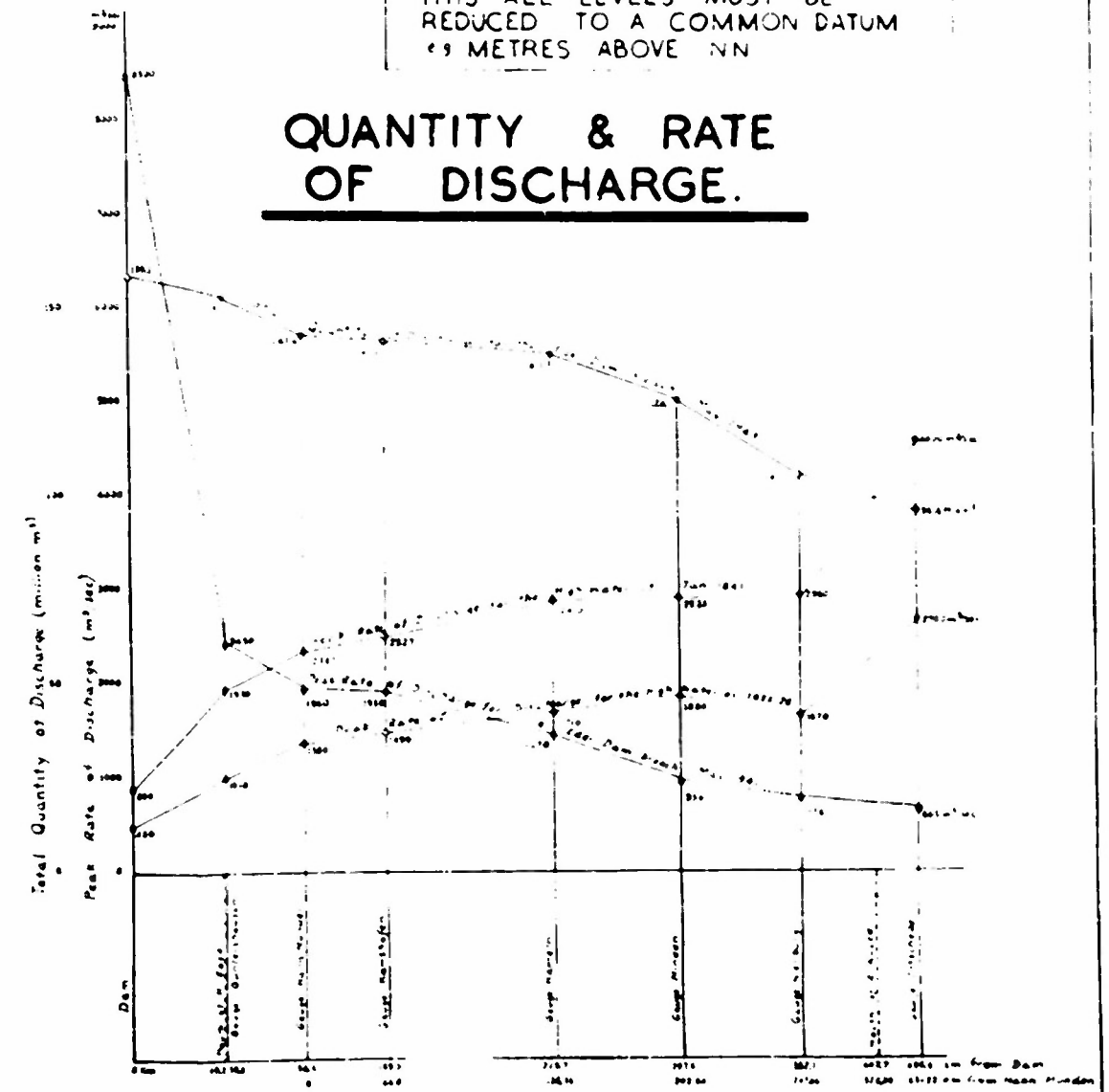


NOTE

THE VERTICAL SCALE FOR THE HEIGHT OF WATER AT THE DAM IS IN METRES ABOVE N.N. THE VERTICAL SCALE FOR THE WATER LEVELS AT THE VARIOUS GAUGES DOWN THE RIVER IS IN CENTIMETRES ABOVE THEIR RESPECTIVE GAUGE ZEROS (PN)

THUS IT IS NOT POSSIBLE TO MAKE A DIRECT COMPARISON BETWEEN THE CREST HEIGHTS OF THESE CURVES TO DO THIS ALL LEVELS MUST BE REDUCED TO A COMMON DATUM 49 METRES ABOVE NN

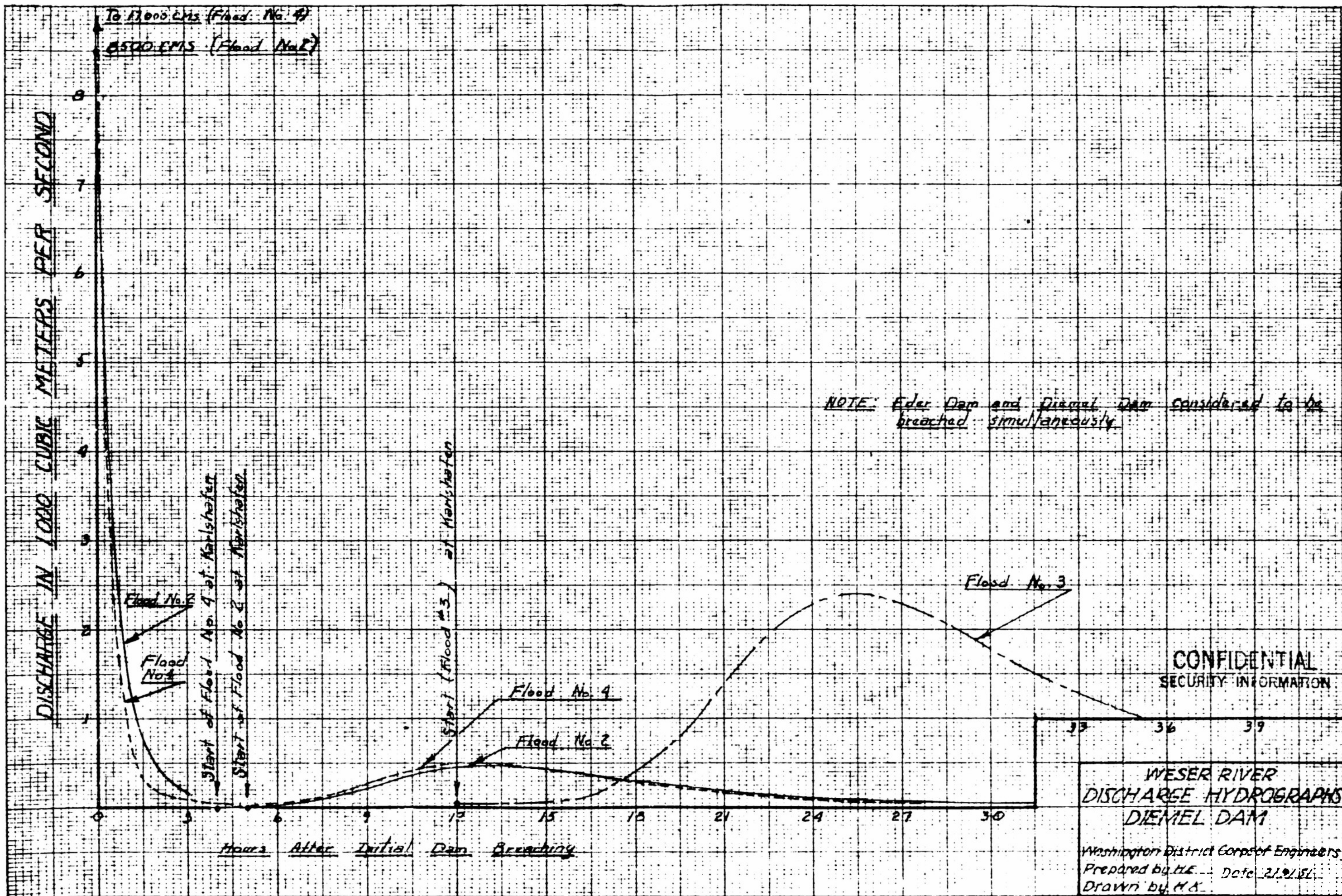
QUANTITY & RATE OF DISCHARGE.



WESER RIVER STAGE HYDROGRAPHS

Washington District Corps of Engineers
Prepared by J.H.
Drawn by J.H. Date Feb 1952

Reproduced from "REPORT ON WESER SYSTEM" C.E.H.Q.-B.A.O.R. 1946.



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SECURITY INFORMATION

SUMMARY OF ARTIFICIAL FLOODS

Location	Dist.	Base Flow cms	Peak Flow cms	Peak Stage m / NN	Time From Dam Breach To:		
	from Dam				Start	Peak	End of
	Km Ym				of Rise hrs.	hrs.	Rise (1) hrs.
	(2)	<u>FLOOD NO. 1</u>					
Eder Dam	0	-	8,500	213.04	0	0	24
Gunterhausen	50.8	10	2,450	149.15	6	12	82
Hann Muenden	94.4	30	1,960	123.47	11	21	78
Karlshafen	139.0	40	1,930	101.91	16	28	82
Hameln	229.7	65	1,470	66.36	30	54	117
Minden	297.6	75	954	41.19	40	70	151
Nienburg	362.1	90	776	23.44	54	82	158
Intschede	425.6	150	665	10.1	60	94	130
	(3)	<u>FLOOD NO. 2</u>					
Diemel Dam	0	-	8,500	344	0	0	10
Karlshafen	85.3	-	480	98.2	5	13	37
	(2)	<u>FLOOD NO. 3</u>					
Eder Dam	0	-	17,000	218	0	0	12
Gunterhausen	50.8	10	3,200	150.1	4	10	68
Hann Muenden	94.4	30	2,530	124.4	9	19	68
Karlshafen	139.0	40	2,370	102.3	12	26	68
	(3)	<u>FLOOD NO. 4</u>					
Diemel Dam	0	-	17,000	346	0	0	8
Karlshafen	85.3	-	500	98.2	4	12	32
	(2)	<u>FLOOD NO. 5</u>					
Eder Dam	0	-	4,000	211	0	0, 5, 10 ⁽⁴⁾	37
Gunterhausen	50.8	10	2,200	148.6	5	16	52
	(2)	<u>FLOOD NO. 6</u>					
Karlshafen	139.0	40	2,500	102.5	5	26	68
Hameln	229.7	65	1,890	66.9	16	50	103
Minden	297.6	75	1,200	41.7	30	68	141
Nienburg	362.1	90	950	24.0	46	80	148
Intschede	425.6	150	810	10.6	54	88	120

(1) Taken as point of recession to Mean Water

(2) Distance from Eder Dam

(3) Distance from Diemel Dam

(4) Progressive partial breaching

SECURITY INFORMATION

WIDTHS OF FLOODED AREA & DURATION

OF FLOODING RESULTING FROM ARTIFICIAL FLOOD NO. 1

Location	Km.	Elev. m+NN	Width from River Centerline kilometers				Hrs. Time Overbank
			(A)		(B)		
			L	R	L	R	
Hann-Muenden	0	123.5	.05	1.00			24
Veckerhagen	11.0	118.2	.30	.20			
Gieselwerder	28.0	109.5	.40	.15			
Karlshafen	44.6	101.9	.50	.50			24
Beverungen	53.0	100.7	.30	.80			
Luchtringen	72.8	90.8	.50	.50			
Polle	92.2	83.3	.50	1.00			
Bodenwerder	110.8	76.2	2.50	.50			
Grohnde	122.2	72.0	.40	.30			
Hamel (Weir)	135.3	66.4	.50	.05			24
Rinteln	163.	56.3	.50	.05	3.00	.20	24
Vlotho	183.	49.0	.10	.10			
Porta	198.4	43.1	.05	.05			
Minden	203.2	41.2	.10	.20			24
Petershagen	215.6	36.8	.05	.10			
Schluesselburg	236.4	31.7	.30	.10			
Landesbergen	249.3	28.3	.20	.15	2.00	.15	36
Leeseringen	259.5	25.5	.05	.05	.50	.50	
Nienburg	267.7	23.4	.05	.05	1.00		30
Drakenburg	278.9	21.2	.20	.05			6
Sebbenhausen	286.2	19.9	.05	.05	1.0	.30	6
		*17.0					
Hoya	299.0	17.5	.10	.05	1.5	1.50	6
		*15.0					
Doerverden (Weir)	308.8	15.5	.05	.05	1.0	2.00	6
Rieda	316.2	13.6	.30	.10	.30	3.00	12
Hutbergen	323.2	12.0	.10	.10	.50	1.00	24
Intschede	331.3	10.4	.30	.40	.50	.50	36
Grinden	336.1	9.3	.30	.10	.30	3.0	36
Baden	339.3	8.7	.60	.10			36
		* 6.4					
Bollen	351.7	7.5	.10	.30	1.00	3.00	**
		* 5.0					
Hemelingen (Weir)	362.0	7.0	1.00	.20	**	.50	**

* Weir open
* Weir raised

** (Overbank only with weir raised)

(A) Width of flooded section, resulting from Eder Dam breaching;
levees along stream intact

(B) Same but with levees breached

Exhibit No. 41

SECURITY INFORMATION